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EDITED BY WILLARD N. CLUTE

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NOTE AND COMMENT.

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CONTENTS

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WILLARD N. CLUTE EDITOR

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WILD BALSAM APPLE.—*Echinocystis lobata.*

THE AMERICAN BOTANIST

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SQUASHES AND GOURDS

BY DR. W. W. BAILEY.

WITH the possible exception of maize or Indian corn, no plant has received so much attention from the botanical histologist as pumpkin or squash (*Cucurbita Pepo*). Its ready accessibility, ready and rapid growth, life confined at most to a few months, and hence quickly exhibiting its complete history from seed to fruit, make it especially attractive to the student. It is easily sectioned for gross work, and its flowers, too, are interesting. These show a very curious circumflex anther, resulting from the coalescence of several. The plants are monoecious, and the pistillate flower can always be distinguished by the projecting ovary beneath.

Besides the various squashes, pumpkins and vegetable-marrows (sacred to Mrs. Nickleby!), there are many related plants. The larger family assemblage embraces gourds, melons in all their varieties, the cool, refreshing cucumber, adopted as a type of moral and physical calm and indifference; the wild balsam-apple (*Echinocystis lobata*), that beautiful nuisance so abundant about our cities, and its cousin, the star-cucumber (*Sicyos angulatus*), equally prevalent and very unsightly, and in Europe the pretty bryonia twining or climbing over copses.

All the squash family are climbers or trailers—plants which in football terms, succeed by "going round the ends"—or by strategic passes not requiring physical strength. "Those also serve," in the struggle for life, who take advantage of every opportunity to advance. When they possess tendrils, they are opposite to the leaves and hence usually regarded as attenuated stem axes, the main growth being continued by a

bud more vigorous than theirs. These tendrils reach out like fingers till they catch some support. Then the tips coil around any obstacle, get a good grip and by increase of tension pull the plant nearer to the support.

Now, as it might happen that the constant torsion in one direction would break the tendril, it, after a while, reverses the direction of the twist, so that one commonly finds in the middle of the helix, a short, straight piece.

The squirting cucumber (*Momordica elaterium*) is one of the freaks of this interesting family. It is a plant of the Mediteranean region of Europe, with small yellow flowers. These are followed by a cucumber-like fruit, beset with weak prickless. The pedicel projecting into the wall substance of the fruit, terminates in an enlarged portion that may be compared to a bottle stopper. The fruits are pendent. When ripe, the tissues of the wall break down, the stopper is released, and the fruit disengaged from the vine. Simultaneously, there is ejected from the opening a jet of mucilaginous liquid, carrying the seeds in suspension. It is quite likely that the emulsion is thrown upon some grazing animal, and later rubbed off in some new locality—ensuring distribution and changed environment.

While so many of the Cucurbits are in part edible, there are noxious members among them, and even the familiar table fruits bear watching, say as regards their rind. Most of them are acid, and some are powerful purgatives, notably colocynth or bitter apple, supposed to be the Wild Gourd of Scripture. As every one knows, especially at the South, gourds are natural dippers, pitchers, cups and basins, almost ready to hand, and often beautiful from their natural curves and colors.

The "gaudy melon flower—the little children's dower" of Browning, is not so brilliant or gorgeous as that of our squash, a thing of beauty, a tent of cloth of gold. Its yellow

too, has all sorts of fascinating crinkles and curves. The plant sprawls about over the ground and rarely shows any particular resort to its tendrils. Perhaps it is slowly abandoning an old habit—or, is it, on the other hand, acquiring a new one? There is a chance for the philosopher to speculate.

The squash plant loves to make a dash for freedom, and to tumble out of the garden bed down an embankment, or to scale some stone wall not too high. Squashes and pumpkins—we now speak of the fruit—in late autumn love to expose their golden sides, Midas-touched, to the sun. They seem types of utmost prosperity—suggesting bounteous dinners and the re-gathered family. Always we expect to see Cinderella's coachman, in fairy livery bedight, step up and take possession of the plumpest. A fitting gift for carriage purposes surely—better than costly motor even, from any fairy God-mother.

Brown University, Providence, R. I.

SOME FOREIGN NUTS

BY MISS PAULINE KAUFMAN.

WE HAVE so much foreign food material in daily use that it takes something very striking to attract notice. Under this head comes what the dealer calls the paradise nut, a name, though richly deserved, recognized by neither dictionary, botany nor any work on horticulture. More success attends the botanical name *Lecythis ollaris,* or pot-tree of Brazil. The tree belongs to the Myrtle family (*Myrtaceae*). Its leathery leaves are alternate, and the clusters of large flowers are borne in a raceme. The hard woody capsule, bearing the nut-like seeds, is about six inches in diameter, shaped like a vase or urn, with a circular lid, two inches across. When the fruit has reached maturity, the lid opens with a sharp report, scattering the nuts, and giving the glad tiding to the monkeys in the neighborhood. The nuts or seeds are from two to three

inches long, three inches in circumference in the widest part, tapering to a rounded point at the lower end. The shell is of a cork-like texture, though not as soft as cork, and has a number of ridges and grooves. These meet in a blunt point at the upper end. The shells, easily opened, even by the pressure of a light foot, disclose a long kernel, which at once shows kinship to the Brazil nut, as it also does in taste; but to the latter it is vastly superior, the flavor being most delicately sweet. The empty vase is both useful and ornamental and is called a "monkey pot."

The cashew nut, of which the editor drew so luminous a picture, in the January BOTANIST, is another novelty here. A friend returned from Jamaica, introduced it to us. It has not gained high favor. It resembles a lima bean in looks, and is inferior in taste to be a good peanut.

Pistachio nuts, slightly wasted and salted, have ceased to be a novelty. The market also affords monstrous paper shell pecans three inches long; and the English filberts or cob nuts much larger than our hazel nuts.

New York City.

THE ADVENT OF SPRING

BY WILLARD N. CLUTE.

SPRING belies the calender and is bound by no set dates. Her mingling of snowstorms and sunshine in the early days of her reign is exceedingly perplexing to those who go by the almanac and expect the vernal season to begin without fail on a certain day. Those who are alive to the subtile suggestions of coming mildness, and can feel the pulse of the year, as it were, anticipate no abrupt transitions. In spite of cold and storm they mark the signs of Natures resurrection long before the ordinary observer has noted them.

We commonly feel that in some way spring follows the sun southward, and is not to be expected until that luminary

has again reached a certain height in our heavens; but a ramble along the country side at this time of year, is likely to impress one with the idea that the season has retired underground, instead. In the depths of the pools life is apparently as abundant and as lively as in summer, and on land, down among the dead and yellow grasses, the perennial plants have been showing star-like bits of green all winter. Other storms may come, but these things show us how close in the milder season. Just beneath the surface of the earth, spring bides her time.

The first flower of the year, is supposed to bloom in suburban gardens and to come from the ranks of the snow-drops, hyacinths and crocuses. The truth of the matter is, however, that these imported beauties are all outdistanced and put in the shade, as it were, by a sturdy native American. This species is common in every bit of boggy or marshy ground in the Eastern States and is so impatient to put forth its flowers that it often tries to bloom shortly after Christmas. Although March is its chosen month, specimens in full flower are often found by the middle of January. No care is ever taken to cultivate the plant. By common consent it is given a homely name and left half-buried in the mud of its boggy realms. Yet, if one can but disassociate the flower from its common surroundings and forget its infernal odor, our humble skunk's cabbage appears as handsome a flower as any. Indeed, report has it, that these same blossoms find their way to the larger cities and in the hands of shrewd venders become "black lilies" or "Japanese callas" and readily sell to those who have forgotten their boyhood days or have never seen the country in spring. Aside from its disagreeable odor, the one fault of the plant is its commonness. If it were some rare thing, it would doubtless be sought for our gardens and conservatories as, in fact, it is now, outside the region in which it grows.

While of obscure origin, the skunk's cabbage it not with-

out good "connections." The queenly calla lily is among its nearest of kin, and so is the Jack-in-the-pulpit and the calamus root, these latter well known to country boys at least. In point of beauty, the flower clusters of our plant are a match for many flowers more famous. Its great purplish spathes, curiously mottled with shades of green yellow and brown are among the largest of ourr native wild-flowers. In shape, too, they are unique, reminding one of some delicate sea-shell enclosing the true flowers, bunched in a round head within. These flowers produce quantities of pollen, a fact of which the honey bee is well aware. It is here that she gets her first pollen and she not infrequently ventures after it so early in the year, that she freezes to death by the way. Other and smaller insects often visit the flowers, and a certain thrifty spider that lives in the bogs takes advantage of this and spreads her web in the spathes.

In New York and New England, the blue-bird and robin are popularly supposed to herald the advance of spring, but the song sparrow is not a bit behind them and but for his retiring ways would probably receive the greatest homage. In the latitude of New York and Chicago his slender pipe is heard long before the others and in mild winters it is doubtful if he leaves several of the northern States at all. The "January thaw" loosens his voice and on all bright days thereafter his tinkling notes may be heard, though to many the song is drowned in the hum of the city, or confused with the noisy chirping of the voluble English sparrow. When the migratory song sparrows come up from the south and the voice of our resident birds takes on more mellowness, spring seems fairly to have begun, no matter what the temperature or the aspect of the sky. These little ground-loving, brown birds seem part of the earth itself and their liquid notes, sprinkled from bush to bush along the thawing stream blend

into harmony with the tinkle of falling icicles and the plash and gurgle of the water.

One who should write a poem to March and place butterflies, flowers and bird's nests in it, would doubtless be handled roughly by the critics as a spring poet who had got ahead of the season, yet such a poem could be written without in the least misrepresenting the facts. In the hemlocks by this time, the crows have begun housekeeping and the little screech owl has stealthily selected a site for her nest in the depths of some hollow tree. The crow is less careful about the concealment of her nest, especially in parks. She is quick to learn and knows her advantages as well as anybody. The owl has the reputation for wisdom, but the crow has the wisdom. In the country where the crows are not protected, they are as wary as ever, but in the parks they are quite fearless as if confident of their immunity.

In February or March a walk on a bright day will often show both caterpillars and butterflies about. The caterpillar, well named the woolly bear—is a hairy animal, brownish red in the middle and black at both ends and seems absolutely careless of the weather. Freezing seems not to harm it. It is frequently found creeping over the snow. A cold day may stop its travels by freezing it stiff, but the next sunny day, it thaws out and goes merrily on. Almost any day now, in the woods, one may chance upon the mourning-cloak butterfly, called from its retreat by the increasing warmth to dance over the dead leaves or flutter about the base of the trees on some warm slope. While flying the dark upper wings with a clay-colored border makes the insect conspicuous, but when it alights upon either tree or rock it seems almost to vanish as if absorbed by the object, so completely does the under surface of its wings which are now closed together over its back, mimic and blend into the colors of its resting place. Although apparently just awakened from a winters sleep,

these insects seem to be pretenaturally suspicious. Theirs, however, is a wisdom that comes from experience. Examination of a specimen will show wings that are battered and faded from battling with the elements of a season past, and destined to wave but a short time longer in the one to come. If these aged individuals can remember, what curious experiences they must be able to recall, as they doze away the wintry days, safe hidden beneath a strip of loose bark on some forest tree.

After the first of March, each day sees the signs of spring become more pronounced. The catkins of birch, alder and hazel begin to lengthen, the buds of maple and elm swell almost to bursting, and the twigs of the willow, dog-wood and cat-brier fairly glow with color. Their veins are full, and they but wait the encouragement of a few warm days to border the streams and thickets with tender green.

A NEW BLUEBERRY FROM NEW YORK

BY STEWART H. BURNHAM.

THE species of blueberry, here described, appears to be a well-marked one growing with *Vaccinium Pennsylvanicum* Lam. and *V. vacillans* Kalm. It is, however, more closely related to the latter species, but may be separated, not only by its greener leaves, which are scarcely glaucous, but also by its larger fruit almost destitute of bloom. The flowering and fruiting season is one or two weeks earlier than that of *V. vacillans*.

VACCINIUM DOBBINI, n. sp. An erect shrub, 2½-4 dm. high, with reddish brown or rarely greenish bark, branches greenish, roughened with numerous minute warts, twigs soft pubescent in lines with white hairs. Leaves mostly elliptical, 2½-4 cm. long, 1¼-2½ cm. wide, mucronate, tapering at the base, serrulate with white-tipped teeth, smooth above, green and prominently reticulate-veined beneath and slightly

hairy on the midrib and veins at the base. Flowers in clusters of 2-6, usually borne near the ends of the branches when the leaves are half expanded, on short, stout pedicals, 2-3 mm. long; corolla white, short cylindric or ovoid, constricted at the throat, angled, about 7 mm. long and 5 mm. thick; calyx-lobes smooth, obtuse, green or tinged with red. Fruit dark blue, with little or no bloom, 6-10 mm. in diameter, sweet and well flavored.

Type Station:—Exposed rocky soil, Peaked Rock, Anaquassacook Hills, town of Jackson, Washington county, N. Y. *Dobbin & Burnham*: 4 July, 1904, and 19 May, 1906. This species is named for my friend, Frank Dobbin (1873 ——); who for several years has made a careful and painstaking study of the Flora of Shushan and vicinity.

Albany, N. Y.

TREES INJURED BY THE SEVENTEEN-YEAR CICADA

BY H. C. SKEELS.

THE seventeen-year cicada made its appearance in the northern part of the Mississippi valley during the year 1905. Throughout the Desplaines valley the forests of oak showed brown and sere during August, because of the fact that the cicada in laying her eggs makes a slit through the bark of the twig, down into the sap wood, thus injuring the branch to such an extent, that a little wind or a heavy rain will break it off or leave it hanging dead and brown on the tree. Some branches showed only a few slits, five or six in a row; others were literally ripped along the bark for a foot or more. Many young trees were so badly riddled, that they lost three years growth, dying down to within a foot of the ground. Branches that were of such diameter as not to be broken because of the slits, were opened up to the attacks

of plant lice and fungi so that the extent of the damage cannot be estimated for several years to come.

The most interesting feature of the cicada work was the very noticeable fact, that, though the ground was covered with injured branches, and the trees generally hung full of them, some trees were not injured at all! The forest of Arden near Joliet, Ill. gave an excellent chance to investigate this fact of the immunity of certain species. The Forest is a three-hundred acre piece of oak and maple woods in which other trees are naturally interspersed. It has been woods ever since the glacial epoch, to go back no farther. The seventeen-year cicada has laid its eggs on these trees and their ancestors through all of that time. Anyone who heard their constant singing during the month of June, would make no question as to the numbers of individuals, and the probability of their finding and using every available place in which to deposit eggs. Nor would there be any doubt that any species not used by the wives of these drummers was exempt because of some quality inherent in its own being.

Another reason why the Forest afforded an excellent means for testing this question, lay in the manner of its planting. While the foundation is a native woodland, the botanical planting has been arranged along the five miles of drives, laid out for landscape purposes; and the planting has been done with the object always in view of keeping the natural wild appearance in predominance. So the planted trees and shrubs are surrounded on all sides by native trees and shrubs growing where the ancestors of these cicadas left them seventeen years ago.

To be explicit, if I have a plantation of about twenty-five species of evergreens, interspersed with gooseberries, dogwoods, ash and willows, and I find these native trees and shrubs ripped almost to pieces, and find only one slit on one

white pine, am I not justified in believing that the cicadas avoided the coniferae because of some inherent quality within these trees? In the same way, when I find the greenbrier climbing over a thorn tree that has had eggs laid on all branches less than one-half inch in diameter, and the brier is not slit at all, I believe it is because the cicadas did not like the greenbrier.

The walnut was used to some extent, the butternut hardly at all. The three species of hickory, bitternut, pignut, and shagbark, were used freely, but the thickness of the twigs prevented their being injured to so large an extent as the smaller twigged trees. The poplars and willows were freely used. I could not help wondering, when noticing the rapidity with which the wounds of these trees healed, if the young cicadas ever found themselves grown in!

The oak family suffered largely; the ironwood, blue-beech, hazel, all birches, alders, chestnuts, oaks, even little trees still in the nursery, being slit and ripped without regard. Indeed, the beechnut plantation, consisting of ten fine trees about five feet high were ripped so vigorously as to be killed back to the ground. The three elms and the hackberry were used somewhat, while the mulberry was skipped entirely, and the tulip tree nearly so. The papaw was also entirely free from injury. There are about five acres of native papaw in the Forest growing among the maples. These maples and youngsters of other sorts among the papaws were ripped and slit as with a rip saw, but the papaw escaped without a single scratch.

The barberries as might be expected, were exempt, as was also the spicebush, while the sweet-scented shrub (*Calycanthus*) was used to a slight extent. There was no sassafras in the Forest, but a native roadside copse near Joliet showed no signs of cicada work. The gooseberries and black cur-

rants were used, but the witch-hazel was nearly exempt. The buttonwood was used slightly.

This brings us to the rose family, where the greatest damage, outside of the maple was done. To begin with, the ninebark and the spireas, native and planted were exempt from taxation, as was the shrubby cinquefoil. But the roses, except possibly *R. humilis,* which was too small, and *R. setigera,* too spiny; the blackberries; the raspberries, red, black, and purple; the apple, cherry, peach, pear, and plum; wild, cultivated, native, European, Siberian, or Japanese; choke-cherries, shad-bushes; and thorns were literally cut to pieces! The thornapple, in fact, was the test plant used in case of doubt. It is not possible to stand anywhere in the Forest where there is not a thorn bush or tree in sight. When a tree was found that had not been used, it was necessary only to look at the nearest thorn bush to be assured that the location was liberally supplied with cicadas. And the one-hundred-fifty odd new species from Dr. Sargent were used as freely at the native *mollis,* which is almost a weed. The Judas tree, honey locust, and yellow wood fared as badly, while the Kentucky coffee tree was used only in the nursery, a tree eighteen inches in diameter showing no damage. *Amorpha fruticosa* and the black and hispid locusts seemed to be exempt, but the clammy locust was freely used, as were also the prickly ash and hop tree.

From the burning bush to the buckeye, including the bittersweet, the bladdernut, and all the maples, the cicadas buzzed and sawed to their hearts content; until after a few weeks, the fine green forest canopy turned into a brown and sere mass of broken, hanging twigs, with just enough green to give emphasis to the brown. The buckthorns, the New Jersey tea, the grapes and the Virginia creeper seemed to be untouched, but the basswood and shrubby St. John's wort again cut the list short as the cicadas cut them. The leather wood seemed to be untouched and *Aralia spinosa* hardly

furnished room between the spines. With the dogwoods it was different, all species including the alternate-leaved, silky, Bailey's, panicled, round-leaved, flowering, and red, were used to some extent.

There are no heaths native about Joliet. Of the thirty odd shrubby species planted, only *Clethra* and *Azalea nudiflora* were used by the cicadas. On the other hand, all the ashes, red, white, blue, green, and black, were freely used regardless of color or size. There was one slit on one catalpa, but none on the buttonbush. The black elder was used, but the red seemed to be free. On the other hand, the viburnums, of which ten of the twelve species planted were large enough to be used, were ripped up and down as though they had been planted for that purpose. The snowberry, Indian currant, Sullivant's honeysuckle, and Diervilla, were used; the honeysuckle family generally seemed to be well liked.

It is interesting to bring together the list of trees and shrubs, wholly exempt from these devastating marauders, to see all together the species whose bark or sap or odor caused the cicadas to avoid them. Leaving out the evergreens, which one would hardly expect to be used, the list is as follows: greenbrier, mulberry, papaw, spice brush, witch hazel, nine bark, Spirea, shrubby cinquefoil, prairie rose, Amorpha fruticosa, black locust, hispid locust, Ailanthus, sumac, hollies, buckthorns, grapes, leather wood, heaths, catalpa, and buttonbrush. On the other hand, the kinds most used run in families, and are:—hickories, willows, oaks, elms, currants and gooseberries, fruit trees and bushes generally, most leguminous trees, prickly ash, maples, dogwoods, ashes, and viburnums.

Generally speaking the trees lost most of the growth of 1904, taking with it, of course, the growth of 1905. We are thankful that there are seventeen years between visitations.

Joliet, Ill.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

ANTIQUITY OF THE CARNATION.—The original carnation, known to history for some 300 years before the Christian era, was a five petalled single bloom, about one inch in diameter, of a pinkish-mauve color. In its original state it grew generally throughout the southern portion of Europe, being found in abundance in Normandy, whence it is believed by some historians to have been introduced into Great Britain. It was described by Theophrastus as early as 300 B. C.—*Horticulture.*

PHOTOGRAPHY WITH PLANT JUICES.—It is pretty generally known that photographs are made by covering a prepared paper with a photographic negative and exposing to light under the action of which certain of the chemicals in the paper are decomposed and the picture results. That the juices of flowers may be used in preparing the paper may be new to many botanists. When Sir John Hirschel was experimenting with photography, more than fifty years ago, he discovered that alcholic solutions of the coloring matter found in the petals of various flowers when evenly brushed upon paper, gave most interesting results. Among the flowers experimented with were iris, violet stocks, poppy, etc. The juices of many flowers did not yield a color like the petals from which they were expressed, but upon the addition of alkalies or acids took on different hues. Thus the oriental poppy

(*Papaver orientale*) gave a faint yellowish stain to paper, but immediately turned to scarlet when a weak acid was applied. A photographic negative placed on paper of this kind and exposed to the sun for some time, caused the color to fade out, but upon the application of acid, the picture came out in vivid scarlet. All this is concerned in some way with the familiar fact that a red geranium may be turned from red to blue and back again by the proper application of acids and alkalies.

PLANT STIMULI.—There are many things that affect the direction of growth in plants. We are most familiar with the response of the plant to gravity seen in the seedling, whose first root invariably travels in the direction of the pull of gravity, while the shoot grows against this force. As in most departments of botany, there are technical terms for the response to each stimulus, and thus we have thermotropism—a turning toward heat; heliotropism—a turning toward the sun; phototropism—a turning toward light; hydrotropism—a turning toward moisture; geotropism—a turning toward the earth, and thigmotropism—a turning caused by contact as in the tendrils of various climbers.

LUMINOUS PLANTS.—The daughter of Linnaeus is credited with the discovery that certain flowers emit rays of light under favorable circumstances, but it is to the flowerless not the flowering plants that we must look for the greatest production of light. Most people are familiar with the curious glow that comes upon decaying wood at times. It is commonly known as fox-fire and was for a long time thought to be produced by the wood itself. Further investigation by German botanists have shown that the luminosity of decaying wood, as well as that of decaying fish and meats, is due to the presence of fungi, principally bacteria, though the underground part of a mushroom (*Agaricus melleus*) also emits

light. The bacteria concerned are usually referred to *Bacterium phosphoreum, Photobacterium phosphorescens* and a few others. By lining a glass globe with a material in which these bacteria grow and inoculating it with these plants, Dr. Hans Molisch produced a lamp that would last for two weeks and give light enough for reading coarse print.

BIRDS AS BOTANISTS.—In addition to previous notes in this magazine regarding the tastes of birds for botanical matters, it may be said that the January number of *Nature Notes* mentions several European birds that exhibit an inclination to ornament their nests. A honey buzzard's nest from Sweden was made entirely of green twigs, and the leaves of oak and black poplar; the rough-legged buzzard has been known to ornament its nest with tufts of wood-rush (*Luzula*), and the booted eagle uses pine needles and sprays of white poplar. The trait of decorating the nest seems to be found only in the birds of prey—a group in which one would least expect it.

WILD HYBRIDS.—The mutation theory of De Vries was given publicity just in time to put a quietus on a great deal of erratic species-making. Not so long ago, when a collector found a plant that differed in the least from its fellows, he hastened to describe it as a new species, with a double name in sounding Latin; now-a-days an unusual plant is likely first to start the query whether it may not be either a natural hybrid or a variation of some other plant, one of the so-called "elementary species." This new view is already playing havoc with some of the things that have been passing as good species. In the January *Botanical Gazette,* Dr. D. T. Mac Dougal presents evidence to show that the Bartram oak, known as *Quercus heterophylla* is really a hybrid between *Q. rubra* and *Q. phellos.* The same paper gives a list of more than one hundred other reputed hybrids, belonging to no less than twenty-four plant families. No doubt as botan-

ists gradually turn from the description of new species to a more careful study of the old ones, this list of hybrids will be increased rather than diminished. Contrary to the usual opinion, hybrids are not necessarly, nor even usually sterile.

WOOD-STAINING FUNGI.—Lumbermen and others who have much to do with freshly sawed lumber are familiar with the fact that it is often streaked with various brilliant hues. Usually the lumber takes on these colors after standing for a time in piles. The colors most frequently noticed are brown, black, pink, purple, yellow and blue. A recent investigation of the cause of these colors at the Missouri Botanical Garden brings out the fact that the staining of the wood is due to various microscopic fungi belonging to several genera. In some cases the stain is due to the color of the mycelium of the fungus, and in others to various pigments produced by the plants.

PROTECTIVE COVERINGS OF PLANTS.—The varying degrees of pubescence in plants are most convenient aids to the systematic botanist in distinguishing species, but it is pretty certain that this use is not the principal one for which such out-growths of leaves and stems were designed. Their uses to the plant are to protect from sudden atmospheric changes, to facititate transpiration, or to aid in controlling it, to shade delicate organs, to ward off dangerous insects, etc. A writer in the *Ohio Naturalist,* states that of about two thousand different species of Ohio plants, only one-fourth were glabrous, that is, without any outgrowths from the epidermis whatsoever. Nearly a thousand plants were found to be covered with some description of downy covering. A few were stellate-pubescent and fifty or more were glandular-pubescent. There were nearly sixty glaucous plants in which leaf or stem bears bloom similar to that which appears on ripe grapes and plums. There were also about fifty scurfy and granular

forms, such as are met with in the pig-weeds (Chenopodiaceae). Some few other plants have peltate scales, and others have their leaves dotted with resin or oil.

Flowers Pollinated by Snails.—There are a few plants in the world that are regarded as being adapted to being pollinated by slugs and snails. One would think that such blossoms must be borne by the most deliberate of the plant kingdom for snails are not considered among the hustlers in the insect world. In Malacophilous flowers, as these blossoms are called, the flowers are small, flat and closely assembled so that the snails may easily creep from one to another. In order to keep their voracious pollinators from devouring the blossoms the latter are found to be either poisonous or possessed of a fluid irritating to snails. A few, however, such as *Rhodea Japonica* seem to provide some compensation for the service rendered and produce a fleshy, edible perianth, with which the snails are satisfied.

Orientation of Solomon's Seal.—Referring to our recent note on this subject, the British *Gardening World* offers what seems to be a reasonable explanation of the fact that all the stalks of Solomon's seal (*Polygonatum*) bend in practically one direction. Our contemporary suggests that inasmuch as the leaves are arranged on the stem in two rows and it being advantageous to present the upper surface of each to the light, the stems will be found always to bend in such a way as to expose the leaves to the maximum amount of light. Now, the question arises, does this theory fit the facts? We hope our readers will make an investigation of the subject during the coming spring. If this theory is incorrect, the same publication suggests that the bending may be in agreement with the direction of growth in the rootstocks. In this connection it may be observed that the crested fern (*Nephrodium cristatum*) makes many changes in its leaf-

lets to get the right amount of light. The midrib or rachis is nearly erect, but the leaflets are often twisted until their surfaces are parallel with the surface of the earth.

CLEISTOGAMOUS FLOWERS.—There seems to be a variety of reasons for the occurrence of cleistogamous flowers. In the violet family, variations in heat and cold seem to be the main factors, and in the case of the oxalis, whose cleistogamous flowers appear in summer, it has been conjectured that the lack of proper insects to effect pollination is the cause. In the early part of the year the insects visit the chasmogamous, or open flowers of this plant, but later in the year are attracted to other more showy flowers. The sundew affords a still more remarkable cause. It is explained that the leaves have become such expert insect-catchers, that the insects rarely visit the flowers. This seems reasonable enough if applied to the plants in some sections, but most of us know that the sundew is not always cleistogamous. Other causes of cleistogamy in plants are lack of light, and inundation at the blooming season.

FUNCTION OF BUD SCALES.—The average person is inclined to imagine that the scales on the winter buds of trees are for the purpose of keeping out the cold, but upon consideration it is easy to see that this cannot be. In winter we may find the buds frozen stiff. After a variety of experiments, K. M. Wiegand concludes that the principal uses of bud-scales are to protect the young leaves which they enfold from mechanical injury occasioned by the branches being whipped about by the wind, and from the drying out of the moisture they contain. This latter is doubtless the more important, for even in the tropics where leaves are never exposed to cold, the developing organs are often protected by stipules until they can protect themselves. The hair and wool on the leaves of plants are regarded as devices to prevent evaporation and it

is noticed that the young leaves always have the heaviest covering. A woolly young leaf may be entirely smooth at maturity. Dr. Weigand's paper is published in the June number of the *Botanical Gazette.*

PROLIFICATION OF FRUITS.—When Nature makes an abnormal plant or part of a plant, we often see behind the scenes, as it were, and discover a great deal of her methods. This is especially true of the prolification of fruits, which consists of one or more fruits being borne within another, or from some unusual part of the flower. It has long been held by botanists, that the stamens and carpels of plants are closely related to leaves in their origin, and in these proliferous fruits, we often find buds, flowers, fruits, or other carpels borne in the axils of the normal carpels, just as if the latter were leaves. Occasionally, too, carpels are borne among the ovules within the regular carpels. The peppers (*Capsicum*) are given to this latter method and often bear a smaller fruit inside the usual one.

PROPER DEFINITION OF TUBER.—Ask any botanist to define a tuber and he will reply in substance that a tuber is a short, thickened underground stem, or part of a stem bearing buds, etc., and then you may assure him that the definition is wrong and you can prove your contention by the dictionary. In many books we are informed that the white or Irish potato is a tuber and that the sweet potato is not, the latter being a root, but according to the dictionary both are true tubers. The question then is, shall botanists make the definition for the dictionary, or vice-versa? Examination of the Manuals of Gray, Wood and Britton make plain the fact that botanists regard a tuber as a thickened underground branch, only, but a recent publication of the United States Government (The Propagation of Plants) insists that the sweet potato is a tuber and this is backed up by the books. All this leads to

the further question whether dictionaries or botanical publications are the most desirable mental food for the leading lights in the Government's botanical corps.

A Flowering Fern.—According to a bulletin of the Botanical Department of Trinidad, it has long been rumored that in that island there is a fern which, unlike all others, bears true flowers on its fronds. The idea appears to have originated in this way: The common chickweed of the West Indies—*Drymaria cordata*—has deciduous pedicels and these are covered with a sticky substance which causes them to adhere to anything with which they come in contact. When the seeds are ripe the pedicel loosens from the plant, carrying the seed-pod, which looks much like a small flower, with it. This, adhering to the fronds of ferns undoubtedly gave rise to the reported occurrence of flowering ferns.

The Species-Making Craze.—It has well been said that the easiest way to secure the repeal of a bad law is to strictly enforce it, and it may be added that the surest way of showing the absurdity of the mania for making new species is to allow the radical botanist to continue unchecked his multiplication of forms. At first, we received the various proposed species of hawthorn with proper attention; now any reference to hawthorns at meetings of botanists is likely to produce only smiles. If, as Dr. Burgess insists, there are eighty-one species of *Aster* where Dr. Gray found but two, the conclusion is forced upon us that the early botanists were but bungling students. The word create means to make something out of nothing. There is a suspicion fast gaining ground that modern botanists are fairly entitled to be called creators. In any event, by pushing the making of species to extremes they have convinced the great body of plant students that the old conception of a species is nearer right than the new one.

EDITORIAL

"The fact that I am renewing my subscription for two years more, shows what I think of the magazine" was the message that accompanied a check for $1.60 recently, and the number of other renewals received for two years instead of one indicates that many others are of the same mind. Like all other publishers, we make a special rate to subscription agencies, and we have no objection to making the same rate to subscribers when ordering for two years in advance. Send us $1.60 for two years and save forty cents.

* * *

With the January number, *Muhlenbergia,* edited by A. A. Heller, Los Gatos, California, becomes a monthly publication. It is now in its third volume; the numbers of the first two volumes having been issued as occasion permitted. The editor is a practical printer and knows how to avoid the mortality that affects youthful publications. We have no doubt that this is another magazine destined to grow up, and we are certain that it deserves to do so.

* * *

The article in our January number, entitled "Life History or Natural History" should have been credited to Prof. J. F. Thompson of Richmond, Ind. *School Science* from which we extracted the article gave the credit to the wrong person and we naturally made the same error. The article in question is one that the author need not fear to claim, and we hasten to make amends.

* * *

We commonly make a distinction between wild and cultivated plants, but it may be seen upon reflection that every species of plant is wild somewhere. The seedsmen in their

efforts to provide us with worthy additions to our native plants, have searched the whole world over and now we may stay at home and see the plants of South Africa, Japan, Siberia, Australia and other far lands, by the simple process of sowing the seeds in our own grounds. If you are inclined to think that you can recognize the members of the various plant families at sight, sow the seeds of a lot of these foreigners and see how easy it is to be mistaken. There is, however, great pleasure in watching these unfamiliar species slowly coming into bloom and in examining the structure of the flowers as they open. In our advertising pages appear the notices of two firms, who offer the seeds of a large number of these unusual plants, and we suggest that our readers can find an interesting field for experiment next summer in backyard, botanizing by means of these seeds. Get a catalogue, select the plants with single flowers and Latin names, avoiding the varieties, and add botanical interest as well as beauty to your beds and borders.

* * *

On several occasions we have written in commendation of the excellent series of gardening books, issued by John Lane, London and New York, under the general title of "Handbooks of Practical Gardening." Three new volumes have since come to hand, and it is almost needless to say, maintain the excellent standard of earlier volumes. Especially to be commended is the "Book of the Lily" by W. Goldring, which gives a history of the lily family, full directions for growing and propagating these plants, and what will doubtless be found of most interest to our readers, a description of all species of lily, with an account of the named varieties derived from each. This volume and an earlier one on the Iris, deserve a place in the library of every gardening botanist. The "Book of the Winter Garden" by D. S. Fish gives an acount of such plants as bloom during winter in the

VOL. 12 MARCH, 1907 NO. 2

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CONTENTS

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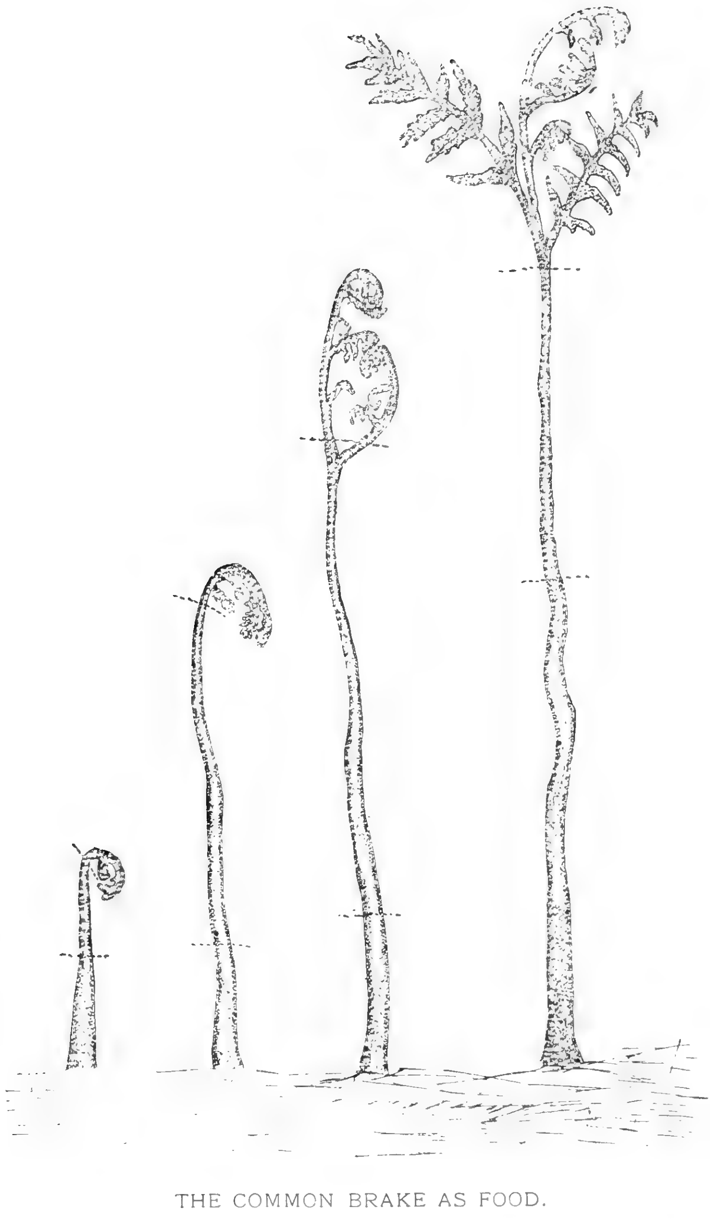

THE COMMON BRAKE AS FOOD.

The portion between the dotted lines is the edible portion.

THE AMERICAN BOTANIST

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THE COMMON BRACKEN AS FOOD.

BY ANNA D. DALGITY.

ALMOST everyone knows the common brake or bracken, (*Pteridium aquilinum*), found in woods throughout the greater part of the world. Excepting possibly Australia (a), it is in Western Oregon, Washington and British Columbia, that it reaches its highest development. In this American area it is not only the most common fern, but the largest as well. In the damp woods it grows up through the evergreen shrubbery of salal, Oregon grape, and huckleberry so densely as to make the woods almost impassible. In the drier regions it reaches a height of three to eight feet, and in hollows where the ground is specially rich it reaches a height of fourteen feet. Occasionally there are four or five to the square foot, but when they are so dense as this, they interfere with each other and do not reach the maximum growth. The tallest are in woods where there is shade, for this makes stems and leaf-stalks grow longer. In cleared fields, however, they come up as densely as in woods, but rarely reach a height of over six feet, usually two to four. In new lands they are bad weeds, coming up year after year. The farmer considers them a pest since they are tough and hard to destroy; and the horizontal, subterranean stems, which are an inch or less in diameter, and as much as ten feet long, are hard to cut. The large amount of starch found in the stems produces numerous shoots and is their source of supply during their rapid growth.

(a). Engler and Prantl, Die Naturliche Pflanzenfamilien, Teill, 1 Abteilung 4, s. 49, 1902.

Pour evenly over the fern mixture. Bake eight minutes, or until the eggs are set. Very good.

To test their palatableness, the dishes were prepared in quantity and offered to classes of fifteen to twenty for judgment. Perhaps three-fourths of these pronounced them good. The taste is not exactly like that of anything else, and like tastes in general, cannot be described except in terms of others. However, to many it suggests the almond. The fern cooks up readily, being softer than asparagus; and it has less woody tissue than asparagus as bought in the market, for the wood is not so near the tip as it is in asparagus. The epidermis is, however, somewhat tougher.

In food values, it compares well with other vegetables of the kind, of which some common ones are given in the table below. (b).

Edible portion, Fresh	Water	Protein	Fat	Carbohydrates, inc. Fiber	Fiber	Ash	Food Value per lb. in Calories
Green peas	74.6	7.0	.5	16.9	1.7	1.0	465
String beans	89.2	2.3	.3	7.4	1.9	.8	195
Okra	90.2	1.6	.2	7.4	3.4	.6	175
Cabbage	91.5	1.6	.3	5.6	1.1	1.0	145
Brake (c)	91.61	1.49	.34	5.32	.5(d)	1.04	141
Radish	91.8	1.3	.1	5.8	.7	1.0	135
Asparagus	94.	1.8	.2	3.3	.8	.7	105
Tomatoes	94.3	.9	.4	3.9	.6	.5	105
Lettuce	94.7	1.2	.3	2.9	.7	.9	90
Celery	94.5	1.1	1	3.3	......	1.0	85
Cucumbers	95.4	.8	.2	3.1	.7	.5	80

(b). The chemical analyses, except that of the fern, are taken from Atwater, W. O., and Bryant, A. P., The Chemical Composition of American Food Materials. U. S. Dept. Agric. Bull. No. 28, Revised Edition, 1899.

(c). For the analysis of the brake I am indebted to Prof. H. K. Benson, of the Department of Chemistry, University of Washington.

(d). An estimate in comparison with that in asparagus.

From the table it may be seen that the brake falls among good foods, its nutritive value being near that of cabbage. In comparison with asparagus, which it most resembles, it proves to be superior, containing .87 as much protein, 1.7 as much fat, and 1.6 as much carbohydrates.

It has been shown that it is a good food, and it has been found palatable by most of those who have tested it. But whether it will become a considerable article of diet or not remains to be seen. The love-apple which was once raised in the flower garden as a plant of beauty is now highly prized as our vegetable, the tomato. Ignorance of tastes habit, and a hesitancy in trying anything new, often prevent one from enjoying some of the best of foods.

The brake was used by the Indians of the Northwest coast before the introduction of wheat flour, but the part used was the subterranean stem. This was dug up, washed, dried, pounded fine, and the coarse shreddy parts removed by sifting. The starchy powder was used as flour. Its use has been discontinued since the introduction of wheat flour. The writer has also been told that the young shoots of the brake are eaten in parts of France.

Commercially it is possible that the brake might be canned and sold like asparagus. Should it become a commercial product, the farmer would no longer need to consider it a pest. The season is short, lasting only about three weeks; but the supply is unlimited, and the product may be had for the collecting.

This investigation was suggested by Dr. T. C. Frye and the work carried out under his direction. To him I wish to express my sincere thanks for assistance and suggestions in carrying out the work.

State University, Seattle, Washington.

SPRING IN STONY PARK.

BY LESTON A. WHEELER.

SPRING came slowly to Stony Park last year; an open winter was followed by a cold and backward spring. The wild flowers were slow to start and those who pushed bravely up were met by cold winds, cloudy days and an occasional snow squall. On April 17th, when I made my first visit to the park, I met with a scant welcome. There were but few things to record except a sort of vague promise for the future. There were a few plants of spring beauty (*Claytonia Caroliniana*) thrusting up their delicate leaves in a sheltered spot beside a rock and a dozen or more stout points were showing where the heal-alls (*Habenaria orbiculata* and *H. Hookerii*) had their dwelling. These orchids are in the vanguard of the armies of plants which will later cover the earth with their beatuy. I have known them, when the ground was not frozen, to come up beneath the snow.

Other early plants are the Hepaticas (*H. triloba* and *H. acutiloba*) blood-root (*Sanguinaria Canadensis*) and the yellow daffodil of our grandmother's garden (*Narcissus pseudo-narcissus*). None of these are native to the park; a part of the first was sent me by a friend in New York and a part were procured by my sister while teaching in Newfane, Vt. The second I found last year in all its beauty beside a road in Townshend. The last were taken from nearby gardens. All are at home, the last rivaling the natives in earliness.

By the 22nd, I found a few of the dainty pink and white blossoms of spring beauty in a warm place and a few more warm days brought them in their millions. Hepaticas were also in bloom; one root showing beautiful blue flowers; the others were nearly white. A cool week passed before I again had time to visit my wild friends again, and when I did so it was to find the army steadily advancing with many new species in the ranks. *Viola Selkirkii* was blooming in the seam of

a warm ledge. This violet has such large flowers and so many of them as to be all out of proportion to the size of the plant.

Grape hyacinth (*Muscari botryoides*) was formerly grown in a bulb-bed, since abandoned, within the park but was later set in considerable quantities among the rocks and ledges where it is as hardy as a native. Its dainty spikes of white-tipped, blue flowers form a pleasing addition to the native flora. Crocus also is still persisting in the old bulb-bed.

Adders tongue (*Erythronium Americanum*) commenced flowering about this time and the next few days brought out the first flowers of blood-root, yellow violet (*Viola rotundifolia*), Trillium erectum and arbutus (*Epigea repens*). I have never found the bloodroot growing wild in Jamaica.

The yellow violet was a little late this year as it should come with *Viola Selkirkii,* but it made up for it by being through blooming long before its contemporary had any thought of quitting the field. Although my arbutus has been in its present position for several years it does not thrive. The situation is evidently too warm and dry to suit it. It is considered one of the most difficult of our native plants to domesticate, although I have had more trouble with the twin-flower (*Linnaea borealis*), which I have not succeeded in getting to live for more than one season.

Spring beauty and adder's tongue were soon carpeting the park and nearby woods by the thousands and white violets (*Viola blanda*) were commencing to bloom. One bush of *Lonicera ciliata* was getting well to blooming. This is very abundant in this section, growing on moist banks. On the twelfth I noticed nothing new except the appearance in great numbers of Jacob's ladder (*Oakesia sessilifolia*) and a few blue violets (*V. palmata var. cucullata*) in a warm corner. This and *V. blanda* were soon blooming by the million in all parts of the park. Two or three more days brought out the

modest litle bluets, innocence or quaker ladies (*Houstonia cerulea*). These daity plants have been slowly spreading since their introduction into the park several years ago. I have seen them covering acres of moist field as with a fall of tinted snow. A few very warm days saw the finish of the early flowers, but their places were already taken by others.

On the 18th the wild plum (*Prunus Americana* var. *nigra*) growing on a ledge of rock was covered with a fairy cloud of bloom, and a few days later the pin cherry (*P. Pennsylvanica*) was in its full glory. By the 20th, twisted stalk (*Streptopus roseus*) which I set last year, was in bloom; also mitre-wort (*Mitella diphylla*), which my sister procured in Newfane. False mitre-wort, cool-wort or foam flower (*Tiarella cordifolia*) is native to the park and grows in many parts of it. It is much the prettier of the two and blooms about the same time.

On May 28th, *Habenaria Hookerii* began to bloom. It is slightly ahead of time. All the plants are rank and thrifty, five of them with flower stalks. Only one lady's-slipper or moccasin-flower (*Cypripedium acaule*) has bloomed this year, and but two others came up. Their nonappearance is, I think, largely due to what appears to have been a disease which attacked them last fall. The parts above ground of nearly all of my plants turned black and died before the usual time for them to retire for their long winter's rest. I did not like the looks of it at the time but thought perhaps they would come out all right this spring. I did not examine the roots. I had a half dozen that had bloomed for several years and last spring I set eighteen or twenty more. I hoped for great things of them, but was disappointed.

Thus does the spring advance in Stony Park. The flowers in the front ranks have fallen out but their work is not yet done; they have, as it were, retired to private life, perfecting their seeds. Many plants have been introduced,

some for their beauty, others because they were interesting, and still others for the purpose of identification or for specimens. Some of them are extremely difficult to transplant, others act as though nothing had happened. I have never hesitated to take up plants whenever I find them regardless of their period of development. It is necessary to shade some for a few days until they get established. Wood betony (*Pedicularis Canadensis*), which just began to bloom May 31st, is one of the most difficult plants to move successfully that it has ever been my fortune to find.

Somewhat late in the summer, two years ago I found it beside West River, and, it being new to me then, I set a plant in the park. It nearly died and did not recuperate enough to bloom until this year. I tried it again last year and it refused to hold up its head even for a day. Its behavior is very different from what I was led to expect from its appearance.

Jamaica, Vermont.

SOME INCONSPICUOUS FLOWERS.

BY WILLARD N. CLUTE.

ALTHOUGH March is usually cold and stormy, Nature's preparations for the spring go on with few intermissions. The early plants are accustomed to spring from a rain-soaked earth and the first flowers seem not to require much encouragement in the way of warmth. Their is an unbounded confidence in the approach of a milder season all the more striking because not founded upon reason. With few exceptions, the early flowers are not what are popularly called such, but are most of them to be found in the shape of catkins. To the average individual, the notion of a flower is something with showy petals and bright color and he is surprised to learn that viewed from the standpoint of the plant or tree, a flower may lack both these attributes and still perform all necessary functions. Because the forest trees have no conspicuous

blossoms, there are many who suppose they do not bloom at all, and yet, every season, the branches are hung full of flowers and he who will look may be convinced.

In nearly every thicket and fencerow, the hazel is soon blooming. Nature, thus early in the year, begins to fashion the hazelnut, or filbert, as it is called when it gets to market. If the nut's history is traced back far enough it is found that one crop is hardly matured before the plant starts upon another. The catkins are formed in Autumn and every mild day in winter seems to add something to their bulk. It is not, however, until some subtle influence underground touches it, that it begins to grow in earnest. Then the stiff short catkins lengthen and become flexible and sift an immense amount of pollen upon the passing breeze. It is not every plant that can sport two kinds of blossoms; the hazel is one that can. The blossoms in the catkins are all male or pollen flowers. The others must be sought nearby. They appear like tiny crimson stars with five rays, scattered along the branches. In order to form a nut, the pollen must fall upon some of these rays. This is the secret of why so much pollen is produced. There must be enough so that the tiny stars shall not be missed.

Down along the water the alder follows the hazel's example and in the woodlands the birch will soon do likewise. The brownish color in the alder's catkins is used by the children in some sections for dyeing their Easter eggs. A few handfuls of the catkins, boiled with the eggs, suffices to give them a rich brown tint. It often happens, however, that Easter, in following the calendar, and the alder, in following Nature, fail to arrive at the same time. Then the dye industry is wrecked for if the catkins open before Easter, their usefulness for coloring on that day is destroyed.

The hazel and alder are called anemonophilous or wind-fertilized flowers because they trust to the wind to carry their

pollen. The pussy-willow whose silvery catkins now abound along streams and the borders of swamps has found another way of securing the transferrence of its pollen. It has called the bees to its aid. The two kinds of flowers are on different shrubs, often long distances apart, but by providing a reward of honey, the bees are induced to go from one blossom to another, transferring as they go, though quite unintentionally the pollen which clings to their bodies. Since the willows are pollinated by insects, they do not need to produce as much pollen as the hazel and alder, but they must secrete honey and thus loose in one direction what they gain in another. Wind-pollinated flowers commonly do not produce honey, for the wind asks no pay for his services.

Among honey-producing trees, must be included the red and white maples, now beginning to bloom along suburban streets. These produce both sugar and honey, but commonly not at the same time. When the tree begins honey making, the sugar maker knows it is time for him to stop, else his product will have a bitter flavor and "taste of the bud," as he phrases it. It is probable that most of those who have spent their lives in the country, walking under the blooming maples each spring, have no idea what beauties are swinging from the boughts overhead. Yet from each bud, springs several tiny bell-shaped flowers as marvellously fashioned as any that bloom in softer airs.

One thing noticeable about nearly all the early blossoms is that they are formed during the preceding autumn. In blooming before the leaves put forth they reverse the usual order of things. Indeed, the witch-hazel which properly belongs to this class, goes a step further, and, having formed its flower buds in autumn, blooms then, too, amid the falling leaves and is now ripening its seeds in the damp thickets. The true summer flowers do not appear until the plants have got their leaves, and the scientists have advanced several the-

ories to account for the behavior of the vernal flora, the most plausible of which has reference to the Ice Age, which is also held responsible for the migratory habits of our birds. Whatever the cause, it is certain that without this provision of Nature, our springtime would be dreary indeed, for we should have to wait for the plants to grow up and make enough food for blossoming. And the flowers, cultivated or wild, which now serve to make outdoors lovely almost as soon as the snow has gone, would be missing, and it might be doubted whether the birds would long have courage to sing under such circumstances.

AILANTHUS.

BY DR. W. W. BAILEY.

FEW trees present more points of general interest than the *Ailanthus glandulosus*, the "Tree-of-Heaven," "Gotterbaum" of the Germans or "Vernis de Japan," Japanese varnish, of the French. The last name, Lindley tells us, was probably applied to it through some mistake.

When at its best it is a large and distinctly handsome tree, to which the immensely long pinnate leaves impart a truly tropical appearance. To cause it to assume a symmetrical appearance, its lateral branches should annually be removed, when the upper ones will form a wide canopy. Hence in France, Italy, and in some parts of our country, mostly in greater New York, it has been much employed as a shade tree. It is a rapid grower and with us makes itself perfectly at home. In the Hudson Highlands I have seen it, quite remote from villages, maintaining itself amidst sentinel cedars and other native forests trees as a dense and beautiful copse.

While its leaves are not generally attacked by insects, it is the favorite food of a superb moth—the *Attacus Cynthia*, which, in larva state, infests it. Beautiful as are our Cecropia, Prometheus and Luna moths, they must yield in rich, oriental

beauty to this silk moth of Japan. The colors are a magnificent blending of olive, rose-color, purple and brown.

The leaves are retained till the first autumn frosts, when the leaflets suddenly fall, leaving the stalks for several weeks longer. An objection to the tree has always been the perfectly disgusting animal-like odor of the male flowers,—"redolent," as Gray says, "of any other odors than those of paradise." But it is not necessary to plant the staminate tree, and the female in fruit, with its large bunches of ash-like keys, has an added beauty. While, as a rule, these keys are of a yellowish tint, I have seen them near the seashore, at Gloucester, Mass. of a superb scarlet simulating the effect of mountain-ash. Indeed, on one occasion, while at some distance, I mistook it therefore.

The plant spreads vigorously by offshoots as well as by seed, and it has been said of it, that if, by some dire calamity, New York should fall in ruin and for a time be uninhabited, it would in a few years be covered with a forest of *Ailanthus*.

Brown University, Providence, R. I.

EARLY BLOSSOMS.

BY FRANK DOBBIN.

TO WHICH of our native plants shall we give the first place as the earliest bloomer? At first thought one would probably mention the arbutus or possibly the hepatica, but stop a moment; what of the malodorous skunk cabbage that pushes its twisted spathe through the soil some time in March. We bring it home, careful to keep it beyond the reach of our sense of smell, because it is a "blossom." But even earlier than this, perchance our rambles has led us to some brook already awakened from its winter sleep and we have been surprised and pleased to find the little golden saxifrage in flower. Inconspicuous though it be, here is a herald of spring, as true as the bluebird or the robin.

Spring; what magic there is in the name! Once more we can go afield and watch for the first comers of the floral procession, confident that though the sharp March winds be blowing yet we shall find signs of Nature's awakening on every side. Let us stop and examine yonder clump of alders. For so long have their catkins been swaying in the wintry blast that one could almost doubt if there were indeed any stir of life within. But let us examine them closely today and now for the first time we get a hint of the gold inclosed under that dull outer coat. Now we will pass along to that willow and if the day be warm for the season and the sun bright we may find a few early insects hovering about it, ready to carry the pollen to some waiting pistils.

Did you ever examine on a breezy spring day, a clump of hazel bushes? Of course you noticed at once the swaying grayish catkins, but did you look farther for the little red tips of the fertile flowers? Here is another of our earliest blossoms. I wonder who is botanist enough to tell from these first signs which kind of a nut that particular bush will produce; whether it will be the one having the long hairy beak, or the one having the nut inclosed in a sort of a ruffled affair, called by the text books an involucre!

Now day by day the sun climbs higher and we may expect at almost any time to find in some sunny nook the first hepatica, pushing its downy flower up amid last year's leaves. Some fence corner will perchance contain a few bloodroot blossoms. Etherial and delicate they are; quite out of keeping with the later rather coarse herbage of the plant.

We are speaking of early blossoms so we must not pass by a plant because it does not appeal to us by some striking characteristic of bud or flower. There is the Pennsylvania sedge, with its yellow tassel of stamens adorning many an otherwise barren spot. On shady banks the birthroot with its down leaves and its curious flower, lying almost, if not quite

on the ground. Crush a bit of the stem or root in the fingers and we have a rich spicy odor, not just like a "breath of Araby" perhaps, but still sufficient to give us a liking for the homely little plant.

What though a few snowflakes fall from time to time it is only a momentary relapse! By these signs we know that spring is here and here to stay.

Shusan, N. Y.

THE PISTACHIO NUT.

ONLY within a short time has the pistachio nut become known in the United States, though it is almost as old as history. The earliest mention of it is in Genesis XLIII:II. The pistachio is the nut mentioned among the list of presents which the children of Israel were commanded to carry down to Joseph to secure the release of their brethern. The list of articles includes myrrh, nuts and almonds. The nuts are the pistachio nuts which are known today.

Some authors give the natural habitat of the pistachio nut as Italy, but that is slightly misleading. The nut is really a native of Syria, where it grows in desert places and where there is almost perpetual drouth. It was greatly prized by all the nations of antiquity, and was one of the dainties of the Greek epicures. Notwithstanding this, it has made its way slowly into other countries and is just coming to be known in the United States.

The nut itself is not as large as a hazel nut, but is rather longer and much thinner, and the shell is covered with a somewhat wrinkled skin.

The tree upon which the nut grows is small, rarely being over twenty feet high, and, as has been said is a native of Syria, and probably Persia.

It is cultivated to some extent in Europe and in Northern Africa. The localities where it will flourish are numerous, and it is not easily killed when once it has been started.

The tree has pinnate leaves, with two pairs of ovate leaflets, and an odd one. The blossoms are borne in racemes. The fruit is ovoid, and about the size of an olive. The nut splits into two halves when ripe. The kernel is of a bright green color and very oleaginous, of a delicate flavor, and with qualities much resembling the sweet almond, though the excellent flavor is more pronounced. The nut is much esteemed wherever grown, but during the days of slow transportation, it was impossible to export them very extensively, owing to their liability to become rancid.

The nuts have frequently been called green almonds, but wholly without reason. They are not almonds, nor are they related to the almond in any way. The oil expressed from them is used for culinary and other purposes.—*American Nut Journal.*

Flowers Modified by Insects.—We seldom realize how much that is attractive to us in floral structures, is not primarily due to the flowers themselves, but to insects. Wind-pollinated flowers, as everyone is aware, are not showy and the large number of stamens necessary to produce pollen enough to ensure seed, indicate how wasteful in the matter of pollen this method is. The flowers that have bid for insect visits by the production of color and nectar, have found it quite possible to get along with fewer stamens. But to do this it was necessary to unite calyx and corolla into tubes in order to oblige the insect to enter the flower in the proper position to be dusted with pollen. Thus in response to insect visits the flowers with curiously shaped and brilliantly colored corollas have arisen.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

ARROWHEAD POTATOES.—Many species of arrowhead (*Sagittaria*) form tubers underground in autumn, which carry the plant through the winter or serve to propagate it during the following year. Tubers of this kind have been observed in *Sagittaria latifolia, S. graminea, S. heterophylla, S. longiloba, S. papillosa,* and various European species, and may possibly occur in all our species. Some of these tubers are edible, especially those of *S. latifolia.* On the Northwest Coast the tubers were formerly much in demand by the Indians and the Chinese are also said to eat them. These tubers are produced at some distance below the surface of the mud in which the plants grow, and when they germinate, a long rhizome is formed, which develops a corm at its tip from which the new leaves and flower-stalks arise.

LOCATION OF NECTARIES.—Not all nectaries are located in flowers. The nectaries on the rachis of the leaves of the partridge-pea (*Cassia chamaecrista*) and bracken (*Pteris aquilina*) are fairly well known. The almond and peach have nectaries at the base of the petiole, while certain species of touch-me-not (*Impatiens*), have nectaries on the stipules. In flowers, a single set of organs does not have a monopoly of the nectaries. In the basswood (*Tilia*) the sepals produce nectar, in buttercups and their allies the petals perform this office and often these organs are little more than nectaries as in aconite.

The Anther filaments in the beard-tongue (*Petstemon*) take up the work and in the marsh marigold (*Caltha palstris*) the pistils are drawn into service. In the majority of plants, however, it is the receptacle that is the nectar-producer and this often produces special glands or disks in which the nectar is found.

ROOT-CLIMBERS.—Plants have various ways of getting up in the world. The morning-glory and hop find it expedient to twine, the grape and Boston ivy develop tendrils that are regarded as transformed branches, while the pea climbs by the rachis of its leaf. *Gloriosa superba* climbs by the leaf tip, clematis and nasturtium climb by their petioles, and the green-briar (*Smilax*), by stipules. This does not exhaust the kinds of climbers. There are still the root-climbers, such as the poison ivy and trumpet creeper (*Bignonia*) that produce aerial rootlets which firmly attach them to their supports. It is believed by many that the contact of the vine with its support is quite sufficient to cause these roots to develop and in general this seems true, but anyone who has seen an old stem of poison ivy must have noticed that the rootlets have certainly not all arisen in response to this stimulus for they spring from all parts of the stem.

ORIGIN OF PETALS.—Relying upon the resemblance between leaf-buds and flower-buds, botanists have often asserted that the floral organs have been derived from leaves. While it is doubtless true that "a flower is a transformed branch," the exact order in which these parts have been transformed or, rather, the order in which each part appeared is often misunderstood or lost sight of. It is very certain that there were pistils and stamens long before there were flowers in any common usage of this term. Pollen grains and certain structures in the ovules of plants are simply spores comparable in all respects to the spores that appear in the spore-cases on the

back of fern leaves or in the cone-like spikes of the horse-tail or Club-moss. These spores seem to be essential to the continuation of the species, so essential, in fact that they appear in the lower orders of plant life long before true leaves of any kind were evolved. Thus carpels and stamens may be the homologues of leaves, but they have apparently never been derived from these structures. When and why petals and sepals arose and whether they were derived directly from leaves or in a roundabout way from stamens and carpels is quite another question. Both views have their adherents, and it is quite possible that in some plants these organs have been derived from leaves and in others from stamens.

Fungus Coloring.—Recent mention has been made in these pages of the various colors due to fungus growths within wood. One color which has probably been noticed by many is due to the green cup fungus, (*Chlorosplenium Aeruginosum*). Most commonly seen in the old branches of oak on the ground, the partly decayed wood assumes a beautiful verdigris green. The fungus grows mostly in the spring, but may be seen most any time of the year. The mycelium or root of the fungus, penetrates in microscopic threads, the cells of the wood, producing the color. The wood so colored either by natural methods or by artificial infection, (Minn. Bot. Survey V. 5, p, 267) has been used to some extent in making veneers employed in the manufacture of Tunbridge ware. The coloring matter can also be extracted from the wood and used for other purposes. The fruit cups of the fungus are not common, but may be found occasionally, not larger than small peas, shaped like an ordinary toadstool, and of the same beautiful green color as the infected host on which it grows.—*Stafford C. Edwards, New Brighton, N. Y.*

Variations in the Toad-Flax.—In examining the *Linaria vulgaris* Mill, with a class in botany, I found the following remarkable and interesting varia-

tions in the corolla. The variations were all found on the same plant. In two of the corollas the spur was absent as was also the usual orange colored palate. The corolla in both of these flowers consisted of five petals, but in one of them there were four petals in the upper lip and one in the lower while in the other flower all five petals were in the position usually occupied by the upper lip. The corolla of a third flower was tubular, about-three fourths of an inch long, of greatest diameter at the base and tapering towards the apex. At the base of this peculiarly formed corolla were three spurs separated from one another by about one third of the circumference of the tube. The apex of the corolla was surmounted by an enlarged crown, circular in form, and orange colored like the palate in the ordinary flower. At the upper end of the tubular corolla just below the orange colored crown were three petal-like tips equdistant from one another.—*J. B. Turner, Hamilton, Ontario.*

PLUR-ANNUALS.—Climate and the varying hardiness of plants has made it possible to divide vegetation into several distinct groups depending upon their length of life. The annuals last but a single season and the biennials store up food the first season and flower and die the next. The perennials, on the other hand, may live for many years and commonly do not flower until one or more years old. There are also variations of these groups. A winter annual is one whose seeds being sown in autumn, germinate and last through the winter to flower and fruit the following spring and then to die. These plants show that annual plants are not all due to the cold. Monocarpic plants are in a sense related to the biennials. They have the nature of biennials, but store up food for more than one season before the supreme effort of flowering. A good illustration is the century plant which does not take a century for food storing as so many people believe. The term plur-annual is rarest of all, though ex-

amples of this class are familiar to all. A plur-annual may be defined as a plant that ordinarily lives more than one season, but which, owing to being transplanted to a region in which it cannot live for part of the year becomes to all intents and purposes an annual. The tomato, castor-bean, red pepper, cotton and many other garden plants are plur-annuals.

Materials for Smoking.—Those who must smoke are not, and apparently never have been, restricted to tobacco. Tobacco is still the principal substance used for smoking and following it comes opium and hashish, the first made, as most are aware from the juice of the poppy and the second from the gum of the hemp. We might call these three the recognized substances for smoking, but many others exist. Many are known to the small boy, such as the pods of the catalpa, mullein leaves, bamboo, cornsilk and cabbage leaves, the latter reputed to be indulged in unintentionally by children of larger growth, when mixed with, their prized Havanas. Possibly it is because the American Indian is more childlike in some things than his white brother, that he mixed a variety of other things with his smoking tobacco. Among these may be mentioned the bark of wahoo (*Euonymus*), red osier (*Cornus stolonifera*), sumac. (*Rhus trilobata* and *R. glabra*), silky cornel (*Cornus sericea*), arrow-wood (*Viburnum*), black willow (*Salix nigra*), mountain laurel (*Kalmia*) and ironwood (*Carpinus*). The leaves and bark of the squaw huckleberry (*Vaccinium stamineum*) was also occasionally used. Several of these things were commonly used under the name of Kinnikinick and this name has persisted to the present as one of the names of silky cornel.

EDITORIAL

Never before in the history of this magazine have we had so many subscribers upon our books, and never have we had fewer unpaid accounts. This speaks volumes for the interest that is taken in our kind of botany. At the outset there were many who doubted our ability to get support for a publication devoted chiefly to economic and ecological botany, but we are proving that they were mistaken. If we can now add at least two hundred more names to our list, we will at once increase the size of this magazine by adding eight pages to each issue. Is this not worth working for? Speak to your botanizing friends about it. Every new subscriber increases the value of the magazine to you. And while we are about it, we would like to get those remaining unpaid accounts closed up and therefore enclose a bill in this number for all whose accounts are a year or more in arrears. It will not cost our subscribers much of an effort to square up accounts, for the sums due are all small. It may be well, too, to remember our offer of twelve volumes for $5.00.

* * *

In a single day's mail this month, we received three orders for sets of the first four volumes of our magazine, *The Fern Bulletin.* These volumes have long been out of print, and of course we could not fill the orders, but this shows how the demand for the early numbers of a good magazine continues. Nearly fifteen years after publication, these numbers are in greater demand, and command a higher price than when first issued. A similar state of affairs is going to exist, some day, regarding THE AMERICAN BOTANIST. The supply is not inexhaustible. Our urgent invitation for all who can, to get a full set, is not made entirely because we desire to sell the magazine. Of course, we expect

to benefit by such sales, but if a single purchaser thinks that he is not also benefited, he may have his money back upon the prompt return of the numbers. In this connection, we wish also to announce a new special offer as follows: We will send the first ten volumes for $5.00 and make the purchaser a present of a year's subscription. If you have some of the volumes, we will send you any ten volumes you may care to order and will add the year's subscription. You may order the next ten volumes to be issued if you wish, the gist of the matter being that twelve volumes may now be had for five dollars, and we do not care what volumes they are. Any person in arrears for subscriptions, may take advantage of this offer to pay up, but this part of the offer is subject to withdrawal without notice.

BOOKS AND WRITERS.

The Plant World, profiting by a good example, has decided to go west and hereafter will be issued from Denver, Colo. Like this same good example it will also be issued on the fifteenth of each month.

This is the season when garden books are in greatest demand. In most sections it is a bit too early to proceed to actual garden-making, but it is not a bit too soon to get the garden plans under way. It may be said at the outset that books are not half so valuable to the beginner as a single season of actual experiences, yet books are not to be disdained even by the gardener who no longer considers himself a novice. There are hints and ideas to be gained from almost any book. Two helpful new books of this kind have appeared in time for use during the present season's planning. The first is from the press of Charles Scribner's Sons and is entitled "The seasons in a Flower-Garden," by Louise Shelton. After some preliminary chapters on soils and planting the book plunges into the season in September when the good gardener really

begins the making of next year's garden. There are seeds to be saved, plants to be moved and notes taken as to the more desirable things to be planted another season. The book follows the seasons from September with timely hints as to work to be done, the best flowers to plant, how to combat the insect enemies, etc. The book costs a dollar and ought to be worth that to any amateur.

A more pretentious book is "Common Sense Gardens" by Cornelius V. V. Sewell from the Grafton Press, New York. This not only discusses gardening matters, but devotes considerable space to garden furniture, walls, fences and the like. It is not, however, a book of directions for garden making, but appears more the opinions of an amateur who had tried many plants and speaks from experience as to their cultivation. Apparently influenced by the reading of English books the author evinces an overweening fondness for box as an edging and hedge plant. Not enough attention seems to have been paid to the necessity for choosing different plants for different climates and our native perennials get off with scant notice. The book is worth owning, however, if only for the most excellent illustrations, one hundred in number, principally reproduced from photographs. These show scenes from many famous American gardens, as well as walls, specimen trees, etc. The book will be of greatest usefulness in the region of country about New York and Washington. It contains nearly four hundred pages and costs $2.00 net.

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CONTENTS

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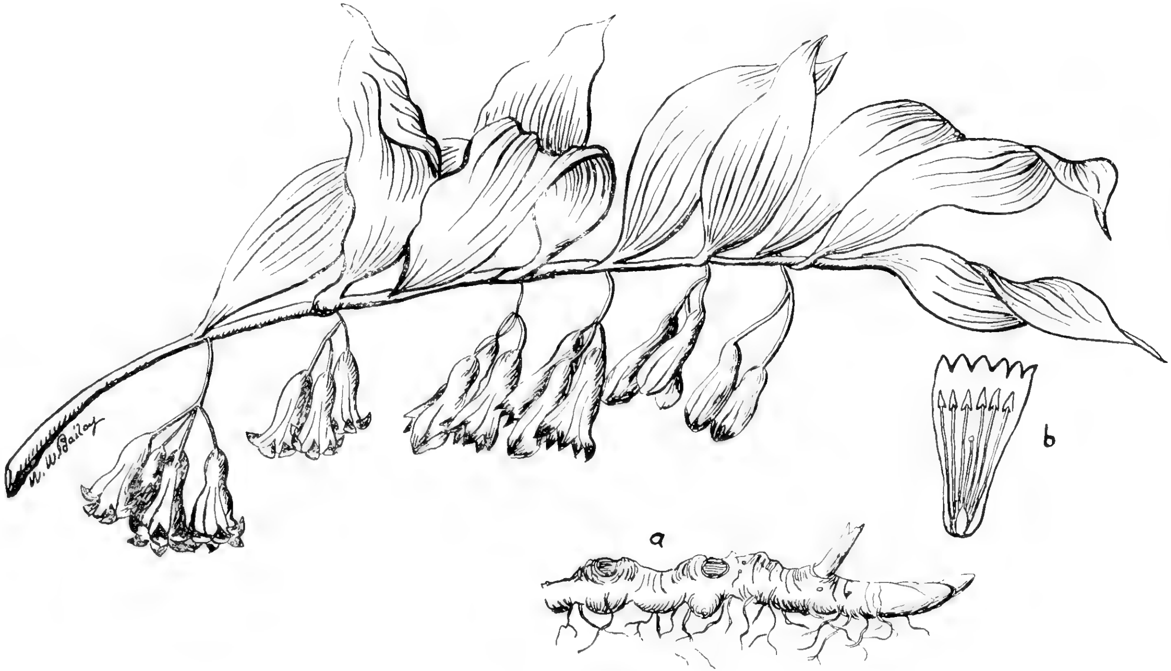

SOLOMON'S SEAL.--*Polygonatum biflorum.*

a. Rootstock
b. Perianth opened.

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SOLOMON'S SEAL.

BY DR. W. W. BAILEY.

A number of distinct plants, but all of the Lily family, are popularly known as Solomon's Seals. The confusion results from a common resemblance to each other in habit and leafage. It is, however, only the species of the genus *Polygonatum* to which the name properly applies.

In these an elongated rootstock, more or less thickened, is observed, marked at intervals by a circular scar denoting where former ascending and leaf-bearing stems have stood. These, as they fall, leave behind them this record of their being. The scars bear a certain resemblance to a seal stamped in wax, hence the name; and as in tradition and fairy tale, a potent seal is attributed to King Solomon, this stamp is considered his.

It will be recalled by lovers of the Arabian Nights that Solomon's seal was enough, so long as it remained unbroken, to confine the tremendous genie, who gave the fishermen so bad a quarter of an hour. In our plants we observe that the much married king, possessed seals of various sizes. Some were official, no doubt; others reserved for his less serious, but frequent correspondence. *Polygonatum giganteum* is his Great Seal of State. So far, we have found it powerful enough to ward off Blue Devils if not more potent demons.

This larger species, from two to seven feet high, is cylindrical and smooth, usually somewhat recurved, giving it a very graceful habit. The alternate leaves, three to eight inches long, are ovate and partly clasping, the upper ones oblong and sessile. All have prominent nerves, an entire margin, and are more or less glaucous. In the axils of the

leaves, and gradually diminishing in size are found the cylindrical, oblong flowers, the creamy white perianth having its six lobes beautifully tinted with apple green. Included are six stamens, and with introrse anthers. The superior ovary is three-celled, with several ovules in each cell, and there is a slender, deciduous style. The capitate stigma is obscurely three-lobed. The resultant berry is globular and black or blue in color. The pendulous peduncles bear from two to eight flowers, the pedicels uniting below into a common peduncle.

This plant is showy enough to be introduced into any garden, and in cultivation increases in size and vigor, soon spreading to an alarming extent. It is hence desirable to give it a bed to itself, or to plant it well back of other things which it will not over-shade. The name *Polygonatum* is from the Greek *polus,* many and *gonu,* a knee, "alluding to the numerous joints of the rootstock and stem."

Our other species, *Polygonatum biflorum,* is very much smaller from one to three feet high, and as its name implies, usually has two flowers to a peduncle, sometimes only one; occasionally as many as three. The flowers are greenish and of no great beauty. While in *P. giganteum* the filaments are smooth and naked, in this species they are papillose-roughened. The leaves are more decidedly glaucous. Here in Rhode Island, it is our only species and is very common. It has a wide distribution according to Gray's Manual, from New Brunswick to Florida, and west to Minnesota, East Kansas and Texas.

The False Solomon's Seals belong generally to the genera *Smilacina* and *Maianthemum,* and we have even heard *Streptopus* and *Uvularia* so classed. There is, one would think, no likelihood of mistaking any of these for Solomon's Seal, yet in Rhode Island, the dainty little *Maianthemum* is almost universally so entitled. It will be recalled that

this pretty plant, which in the writer's earlier days was called a *Smilacina,* has a terminal recene of small white flowers. Under ground it produces yards of a delicate rootstock which required the patience of Walter Deane to wholly unearth, press and mount. This certainly bears no obvious seals.

The *Smilacinas* of which, here in Rhode Island, we have two species, *S. racemosa* and *S. stellata* resemble the last, but on a much larger scale, while *Streptopus* and *Uvularia* are so conspicuously different except in foliage, it would seem impossible that any one should confuse them. The writer's experience is, however, that when people, botanists or other, make up their minds to call anything by a particular name, even the authoritive seal of Solomon himself appended, will not shake their belief.

Brown University, Providence, R. I.

SOME WOOD-DESTROYING FUNGI.

BY L. AUGUSTUS HAUSMAN.

FUNGI are veritably and unmistakably plants; of a low order, it is true, but still, plants, developed from seeds or germs slightly analogous to, but not wholly homologous with the seeds of higher orders. Besides the larger species there exist forms so minute that their structural pesuliarities are discernable only with the highest powers of the microscope. Of these the mildew, blue-mold and gory-dew may be cited as familiar examples.

While fungi attack and destroy much dead wood, they also often attack living trees and cause their downfall. When the spawn of the fungus strikes a substance which is conductive to its growth, the protoplasm or living matter of the cells send forth its vital juice which penetrates the substance and decomposition speedily follows through the rapid growth of the mycelium, the vegetative portion of the fungus. By breaking open old stumps where these plants are growing the

mycelium may be traced throughout all their decaying parts. It is composed of countless numbers of fine hair-like processes with tiny outlets which take up such material as is conducive to the growth of the fungus.

In order to grow the fungus must have a large per cent of moisture, and often, after a rainy spell, one may find such growths on stumps and fence rails in high, dry places, where before it gave no evidence of its existence. The mycelium was there, however, but in a dormant state until the rain nourished it into action.

The genus, which perhaps is represented by the most species of wood destroying fungi, is the *Polyporus*. A few of this genus are reported as edible but the greater number are too corky and tough, when mature, to be fit for food. In the species of this genus the tubes are not separable from each other. One of the most common is *Polyporus hirsutus,* so called from the numerous short stiff hairs which cover the cap, and give it a velvety appearance. It occurs most abundantly on wood of fallen trees but in some cases I have found it on standing trees also. It is usually a sessile species but one may often find it in umbilicate form when it is supported by a short central stem. The cap is grayish or brown, often zoned with lighter or darker shades. The fruiting surface is at first yellowish, then brown, but exceptions to this rule are frequently met with for I have found plants, comparatively young, whose under surface was as dark colored as many of the older ones. The tubes are very regular in arrangement and may be seen very readily with the aid of a pocket lens. In fact it adds greatly to the interest of the observer if he possesses a good lens, as it brings to light many hidden and interesting facts. A damp wood makes an excellent place for the growth of this fungus, especially after a rainy spell, when hundreds of young plants may be found on old brush heaps and dead branches. It is not found to any great extent in high dry woods.

A second species perhaps the most noticeable of all the polypori is *Polyporus betulinus,* or birch polyporus, so-called from its habitat, invariably on the birch. I have heard it called the "hoof-fungus" also, but this name seems to be most applied to *Fomes fomentarius.* *P. betulinus* grows in a hoof shape from both living and dead birches and often attains very large dimensions. Often the cap is evident before the fruiting surface. In the ordinary plant the cap is white; spongy when wet, but when dried it presents a hard, tough surface which is often utilized in the manufacture of razor straps. The under surface is a deep brown. Under the microscope, the cap is seen to consist of multitudes of fine hairs somewhat analogous to the hairs of the mycelium. In fact, any portion of the woody fungi, when submitted to microscopical examinations is found to consist of hairs. As the mycelium itself is composed entirely of fine hairs there can be no doubt but that those which go to make up the fungus proper are merely processes of the same.

In the genus *Lenzites* the spores, instead of being developed in tiny perforations, are borne on the sides of the gills which radiate from that side of the plant which is attached to the wood. Although, in the following species the caps vary greatly in color, the plants may be at once identified by the hymenium which never has any radical change. *Lenzites separia* is perhaps the more common of the two, and may be at once recognized by the brown papery gills. In my collection of this species I have plants whose caps shade from almost pure white to dark reddish brown, well illustrating its changeableness. The average plant however is a deep brown, both above and beneath and the cap is often zoned with darker shades. It is a sessile species, often gregarious and sometimes imbricate. Low, damp woods and high, dry woods are alike conducive to the growth of this plant. It is a pretty and graceful species and thrives under the most adverse circumstances.

Damp woods and swamps seem best suited to *Lenzites betulina.* Of course the rule is not inflexible and one may often come upon specimens growing where he least expected to find them. For the most part, however, different species have different localities which seems best suited for their development and for this reason I am safe in ascribing these different localities to these fungi.

Lenzites betulina is even more remarkable for the variation in the color of the cap than the preceding species. While the cap is usually gray zoned slightly, and the gills are yellow, there are many variations. In my collection I have plants whose caps are white, grayish brown, and in one instance gray with red zones. These changes are due, doubtless to differences in the organic matter which they take up. Young plants are soft and yielding but old plants are firm, though somewhat spongy. The pileus in old plants is often tinted green, due to the growth of algae.

The plants in the genus *Fomes* were formerly classed with the genus *Polyporus*, but modern mycologists prefer to classify them in this group. *Fomes fomentarius* is the most common representative of this genus and is found in both dry and damp wood on logs and stumps. The cap is dark brown, usually with darker zones and the hymenium is the same. The mouths of the fruiting tubes are large and irregular and may be readily seen by the naked eye.

The peculiar shape of the tubes distinguish this species from all others. I have found the largest and most flourishing plants growing in damp woods, particularly besides brooks where the running water keeps the wood on which they grew wet continually, thus affording the plants sufficient moisture to enable them to attain large dimensions. The caps of plants found growing in dry places are lighter in color and more corrugated than the caps of those found growing in damp places. As a rule, the plants grow in single, sessile growths, but in

1903 I took a specimen with two distinct caps. This plant is often called "German tinder" and it is said that it is used largely by the Germans for making fuses. This is done by removing the tube system and beating the fungus until flexible, and then dipping it into saltpetre. In Bohemia they are said to be utilized as flower pots by cutting out the tube system, inverting the plant and filling the hollow portion with earth.

The most beautiful species of this genus is *Fomes lucidus,* so-called from the shining cap which presents a beautiful surface, appearing as if varnished. The color of the whole plant is yellowish then chestnut red. In mature plants the tubes are brown. The surface is quite woody and tough when the plant has matured. Dry stumps are usually the habitat of this plant and it is seldom found in any but comparatively dry places. This beautiful fungus succumbs so quickly to the attack of certain insects which are fond of fungi, that it is difficult to find a mature plant in a perfect state of preservation.

Fomes applanatus has a hard, woody shell, much harder than that of *Fomes lucidus,* in fact it is the hardest of these fungi. The cap is brownish or gray, sometimes white; corrugated, and strongly zoned with annual rings for this plant is perennial. The surface of the tubes is white and the mouths are scarcely visible to the naked eye. Bruises of the tubes turn brown and for this reason it is often collected and drawn upon with a sharp instrument. The plants usually are sesile and single and grow on logs or stumps alike in wet or dry places. It is the longest lived of any of the fungi, for the reason that, being so hard it neither decomposes from an over abundance of moisture, or succumbs to the ravages of insects which attack and destroy so many of the softer species. At certain seasons of the year the cap is covered by a reddish, powdery substance due "to the numerous spores or conidia which are developed on the upper surface of the plant in addition to the smaller spores developed in the tubes on the under surface." (Atkinson.).

These conidia are somewhat analogous to the spores of *Daedalea quercina.*

The genus *Favolus* has but one representative which is native to our woods; the *Favolus Areolarius,* which occurs on dead twigs, particularly hickory. The tubes are large at first, hexagonal in form and radiate from the stem. The stem is either lateral or absent though in most cases it is difficult to judge whether or not the tubes radiate from the center of the stem or from some other point. The cap is white, often with tiny markings of black. The periphery is sometimes involute. The plants are thin and pliant when fresh, but when fully matured they are hard and coriaceous. They never attain large dimensions. Dry twigs seem to be the usual habitat.

So ends the list. I have not mentioned one-half of the species in this large group, which are common to our woods. This branch of nature has been least developed of them all, and although of late years, the compound microscope has done much toward enlightening us in some points, the life-history of the majority of species has still to be disclosed and the prospects of new discoveries for those who persevere in this neglected study, are great.

SOME SPRING FLOWERS.

BY WILLARD N. CLUTE.

EARLY in the year, the season is always a little in advance of the observer, no matter how keen his perceptions. When spring has fairly begun everything develops so rapidly that none can exactly keep pace with it. In time there comes a lull—a distinct period when spring flowers give place to those of summer—but at present it is not the making of flowers we are viewing but merely their unfolding. Nature has been preparing for this longer than we imagine. Six months or more ago the flowers were formed and the food for their nourishment stored up in compact parcels underground so that there

should be no delay when the time came. It needs but a certain number of sunbeams to set them free.

In the procession of the flowers each has its appointed place. The date upon which it blooms may vary, but it is pretty constant as regards its place with regard to the others. We may predict with some confidence the time when any species will be at the height of its flowering season, but the first of their race, the heralds of the coming army, spring up before we are aware of it. Some sheltered nook which gives a slight advantage in the way of moisture and sunshine may contain a little colony in full bloom some time before their less favored kin appear. It is the search for these firstlings that gives so much zest to our spring rambles.

Among spring flowers, there are always a few that lead the rest in popularity. The Dutchman's breeches is one of these. The flowers are rather choice as to location and are valued accordingly, but they are constantly becoming rarer under the treatment they are subjected to each spring. Their favorite dwelling place is on the ledges of shaded rocks, or in rich woodland soil. One cannot fail to note how decorative the handsome foliage and slender recemes of waxy white blossoms appear against a background of gray rock. The plant is a relative of the cultivated bleeding heart and closely resembles it except that the two petals are prolonged into spurs at base. Each receme of flowers looks not unlike several pairs of tiny breeches hung on a line and thus the plant gets its common name. Were the brownies as well known when plant names were given as they are now, it is likely that the flowers would have received another name. The breeches look as if they might easily fit those rotund little sprites.

The bloodroot flourishes in thickets along streams but in many places is rare or entirely absent. It is always an object of interest to the young people who dig up the thick rootstocks and break them to see them bleed. It is apparently good red

blood that flows from the wounds, not a weak looking fluid in which a vivid imagination is required to see any resemblance to blood. It is said that the Indians once used this juice as a part of their war paint. Makers of cough medicines have also found a use for it. The bloodroot is a member of the poppy family all the members of which are characterized by a thick colored juice. In the poppy this juice is white; in the common celandine it is yellow. Although the juice of the bloodroot is red it bears a pure white flower of wax-like texture. Before blooming it is wrapped up in the only leaf the plant possesses.

The yellow bell-shaped flowers of the adder's tongue are attractive enough of themselves to command our attention, but the plants have a singular trait in the behavior of their bulbs which make them doubly interesting. The plants are usually very abundant in wet places, their brown-blotched leaves marking every hollow in the woods. All who have attempted to dig up the plant in flower, know that it springs from a compact bulb at a considerable depth in the earth, often a foot or more. How this bulb got so deep in the soil was long a mystery for it was known that the seed falling on the earth produces only small bulbs near the surface. In such positions they do not bloom. For some unknown reason they must be deeply buried to flower. Certain other plants have thick roots that after getting firmly established contract and pull the plant into the earth, but the adder's tongue has a unique way of its own which consists in developing long runners which worm their way into the soil. These might be described as a sort of portable bulb, for before the summer ends, each has formed a new bulb at its tip, and the parent bulb has withered away. If the runner has gone deep enough, all is well, but if not, the plant has to try again another season. The cunning of the plant, however, has fallen a little short of its object for the runners sometimes come to the surface and spread out laterally instead of descending and it may be several years before the plant, with which

we cannot fail to sympathize, is able to bloom. But it has some gain for its losses. Commonly it has more than one runner which not only multiplies its chances of success, but multiplies the species as well, so that what started at the surface as a single bulb may be several when it blooms. When the bulbs have reached a proper depth, they stop sending out runners, and devote their energies to producing blossoms. The plant is called yellow lily in some sections, and John Burroughs has proposed for it the name of fawn lily, in allusion to its spotted leaves.

The rapidity with which the early flowers spring up everywhere is remarkable, but no less so than their equally rapid disappearance a few weeks or months later. Before mid-summer all traces of many of them will have vanished, and the others will be overshadowed by summer flowers. Yet somewhere in the earth, the spring flowers will be almost prepared for a new spring. When the cold autumn mornings and bright days take the semblance of another vernal season they are occasionally beguiled to put forth. More than thirty different species of spring flowers have been known to bloom thus in autumn.

SAGE BRUSH AND CACTUS.

BY EARL LYND JOHNSTON.

"SAGE Brush and Cactus!" I well remember as a schoolboy of reading in the geographies of these plants as the "characteristic vegetation" of the western portion of our country known as the Great Plains. At that time I had little or no conception as to what that really meant. The cactus I knew well and often wondered if the sage brush was as repulsive in appearance and at the same time pitying and wondering how the people managed to live "out west." However much I felt for these people I was soon to learn that they little needed my sympathy.

I caught my first glimpse of the prairie and prairie plant life on a Christmas day a few years ago. As I crossed the

eastern portion of this stretch of semi-arid country I saw many things to arrest my attention. It was a wonderful sight to me —the barrenness of this region covered extensively at this time with the leafless perennial stalks of the sage brush (*Artemisia*). It seemed to have taken up a homestead on every portion of the land; for every direction one may look he sees it in great numbers. Although growing very abundantly and densely covering the ground each plant seemed to preserve its individuality to such an extent that as far as eye could reach we were able to pick out, as the train rushed on, individual specimens and the approximate space covered by each.

If the sight of the sage brush in winter was one to interest a person how much more did it the next summer. Eagerly I watched it from the time it put forth its first leaves in February until it ripened its seeds late in the fall. As it begins to get somewhat green it becomes a conspicuous plant at all elevations. I have seen it from the dry plains to the desolate regions far up in the Rockies. I well remember finding hid among the alpine rocks, as though doubtful as to the propriety of peeping forth, the diminutive species. *A. scopulorum*. At this elevation (13,000 feet) it was abundant and partook of the characters of the sub-artic flora found there. All the specimens I secured were less than six inches long contrasting greatly to the plant of the plains which is generally two feet or more tall and branching sufficiently to cover several square feet of ground.

The general impression the sage brush makes on one is resolved into a pleasant study as acquaintance proceeds. As with other plants its adaptations for its existence amid its surroundings is a cause for thoughtful study. We are often led to wonder how this plant thrives where others succumb; in fact how it manages to live where many others die. If we are observing we can easily find out. It secures and conserves its water supply by a long, thick, woody and somewhat branching

root varying from three to six inches in thickness and descending to a depth of from four to nine feet.

Those not accustomed to desert life and the way plants manage to exist on an arid plain and in an arid atmosphere would certainly be surprised at the immense roots some of these especially adapted plants have. The sage brush can hardly be said to represent even an average in the matter of root development; for many plants as the "soap weed" (*Yucca*) and the bush morning glory (*Ipomea*) have truly enormous roots. This plant is also provided with very rudimentary leaves and a corky layer of bark encasing the root as well as the stem above ground. These modifications give little chance for transpiration to take place. Thus it circumvents all attempts of the thirsty sun to steal the life-moisture so hard to secure from an apparently moistureless soil.

Again we find that this plant has a bitter acrid taste from which it derives the name wormwood. Animals are forewarned of this taste by the peculiar aromatic odor the plant possesses, which thus protecting itself from the attacks of herbivorous animals. In time when the ground is covered to the depth of several inches with snow when other articles of food are scarce it is eaten regardless of taste and has been reported to cause the death of domestic animals. We find in this plant certain medicinal qualities which are supposed to give it value as a tonic for numerous ailments. Like others of the wild things of nature it tends to recede as civilization advances for one never finds it in cultivated ground.

The genus to which this plant belongs is very interesting botanically as thirty-nine species are reported from Colorado alone. The variations which are now considered of sufficient importance to give specific rank are many and quite difficult to make out.

One who has never seen the sage brush should have (if this description is graphic enough) the following mental picture: It is a plant covering large areas of the plains very thick-

ly although not massed closely together. At a distance it appears globular in form resembling the tumble weeds in this particular. A closer examination reveals a plant about two feet high on an average with a root all out of proportion to its size. Numerous slender stems spring from the crown. These stems branch somewhat and are covered with patches of very small leaves. Some species are shrubby, others herbaceous. Its inflorescence is inconspicuous. It is a plant which seems to hold a title of preemption which others dare not gainsay.

So far I have failed to say much concerning its "boon companion." But wherever you find the sage brush you are also certain to find a clump of cacti of the genus *Opuntia* and and sometimes many others of different genera.

The *Opuntias,* commonly called prickly pears, are always interesting especially when a close acquaintance is made unexpectedly. These attempts at friendship soon teach the animals that roam the prairies that any undue curiosity or familiarity is not desired. These prairie denizens soon understand and give a tract of land containing the cacti a wide berth.

The species of this genus are many and are characterized by very succulent and much branched stems shaped not unlike a pear in outline. These stems are used for storing up of the moisture thus differing from the sage brush which uses its roots for that purpose. These stems are so protected that the moisture is given little chance to evaporate. The innumerable spines and prickles scattered over the surface and the tough, thick and impervious skin incasing the stems arrest the dessicating power of the sun.

So succulent are the stems that they are in great demand by gazing animals and would be heartily eaten were it not for the little forts of tireless watchers whose reminders are not readily forgotten. Various methods are adapted for removing these prickles after which the plant makes an excellent and opportune food for sheep and cattle in seasons of prolonged drouth. Man too sometimes has recourse to them to quench

his thirst: the round species being cut open and drained of the almost pure water it contains.

One perhaps has oftentimes wondered where the leaves of the cacti are. What are known botanically as stems are usually known as leaves by most people. However, one can readily see the difference if he examines these organs and notices that they all branch and that the flowers spring from them. These charasters which are never true of leaves will readily convince him of the fallacy of calling them leaves. The leaves are modified for the necessary function of protection and hence we have a remarkable example of degenerate leaves in the spines of the cactus. These modifications have made the cactus an ideal desert plant.

Cacti have other economic value from that as food for grazing animals. The fibers are used by certain tribes of Indians for making baskets. The spines of some species are used for toothpicks. The fruit of the *Opuntia* is often eaten some say with relish. The taste is rather pleasant at first but a little more than half one "apple," as the fruit is called, will generally suffice for persons not used to it, the taste being a sickening sweet one. In Oklahoma and elsewhere the Indians are said to make a meal of them.

The flowers of all the various species if they could be collected in one garden would form a rare conservatory of beauty unequaled by the efforts of any florist anywhere.

Last of all the cactus should be of special interest to us when we know that it is peculiarly a plant of the New World. Europe knew it not and Asia never saw it before the time of Columbus. It is unheard of amid the isles of the Pacific. Its home is in the Western Hemisphere and there it grows luxuriantly and in many varied forms counting upwards some eight hundred species.

The name, cacti, given to this group of plants by Linnaeus, was perhaps borrowed by him from the Greeks. These people used the word as the name for a plant which was somewhat spiny.

Evans, Colo.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

BIRDS AS BOTANISTS.—Apropos of the interesting note on Birds as Botanists in your February issue, I noticed last spring in a cactus clump on the Mojave Desert a bird's nest prettily interwoven with the blossoms and stems of a small yellow flowered annual of the desert, *Baeria gracilis*. I do not know the bird that used the nest, but it was a small sparrow-like species—certainly not a bird of prey. The cactus, by the way, is a favorite building site for the desert birds, the sharp spines making an excellent defense for them against snakes and egg-eating animals.—*C. F. Saunders, Pasadena, Cal.*

XEROPHYLLUM ASPHODELOIDES.—That is a formidable name, yet the only common one of which we have any knowledge is not much better, being "turkey's beard." More than all the common name has no significance nor appropriateness whatever. The small flowers are borne in a dense raceme at the top of a stalk and are pure white, the only tinge of color about them being a hint of yellow given by the small but bright yellow anthers. Every year when this plant comes into bloom, we feel that it ought to be brought into more prominent notice. It grows in low moist land in shady places. It can be cultivated by imitating nature as nearly as possible. The plant may be easily recognized, its leaves are long and narrow, all starting from the ground, and look very much like those of the old Northern corn lily, (*Hemerocallis fulva*). The flower

stalk starts from the center and reaches a height of from eighteen inches to three or more feet. The flowers are borne in a dense cluster, at the top, from three to six inches long.—*Florida Agriculturist.*

EDIBLE FERNS.—I have never eaten a bracken, but in the Province of New Brunswick, Canada, have found the early shoots of ostrich fern (*Onoclea struthiopteris*), employed as would be asparagus with us. It is quite as delicious, if not more so.—*W. Whitman Bailey, Providence, R. I.* [Several other ferns appear to be edible. The young "fiddle-heads" of the cinnamon fern (*Osmunda cinnamomea*) are often eaten and the rare floating fern (*Ceratopteris thalictroides*) is reported to be used as a pot-herb by the natives in tropical lands. It grows in several places in the United States but usually goes into the herbarium instead of the pot when found. The bracken (*Pteris aquilina*), dried and pressed into cakes, is said to be a regular article of commerce in Japan.—ED.]

TWINNED PISTILS IN PARTRIDGE PEA.—In the late autumn of 1905 while on a botanical excursion with a party of students I found that on a specimen of partridge pea (*Cassia Chamaecrista*) one of the flowers had twinned pods. This hint suggested looking for more, and on our next excursion we carefully examined the plants in a dense growth of this species which we passed through, with the results that we found many twinned pods, and several cases where the pods were in threes. In most cases we found them only after the petals and sepals had fallen, but in several flowers the two pistils were found while the flower leaves were still present. The occurrence of more than one pistil in flowers of certain leguminous genera is well known to botanists, but I venture to say that probably few readers of the AMERICAN BOTANIST are aware that by a little close searching they may be seen in this common plant.—*Prof. Charles E. Bessey, Lincoln, Neb.*

THE PISTACHIO NUT.—The pistachio nut, an account of which was given in the last number is derived from *Pistachio Vera,* one of the *Anacardiaceae.—W. W. B.*

PUBESCENCE OF PLANTS.—I was interested in a note appearing in the February number of this magazine on the protective covering of plants. Here in the vicinity of Los Angeles there are comparatively few plants entirely free from pubescence, the percentage of "protected" plants among the five largest families being about as follows: Compositae, 77%; Cruciferae,73%; Leguminosae, 70%; Scrophulariaceae, 69%; and Umbelliferae, 23%. The very marked difference between the Compositae and Umbelliferae can evidently be explained by the fact that 64% of the latter grow in damp places while all but 29% of the Compositae ordinarily grow in dry soil. Many of them also bloom during the dry season and in this case the pubescence is usually very dense and often the plant is glandular viscid.—*W. Scott Lewis, Garvanza, California.*

PELORIA.—In the March number of this magazine J. B. Turner of Hamilton, Ontario, tells of a curious form of toad-flax he discovered while out with a botanical class. It was that peculiar teratological condition of *Linaria vulgaris,* known to botanists as "peloria," and, I think first noticed and named by Linnaeus in this particular plant. At that time and for long after, it was regarded as a mere curiosity; now it is viewed as a key to interpret the ancestral form of *Linaria.* In the old times before us we now believe that *Linaria* was a regular and symmetric flower, with 5 spurs, 5 divisions of the calyx and 5 good stemens. Perfect peloria—a reversion to the old type—exhibits all these requirements. But we found as Mr. Turner did; two or three spurs only. The irregularity of our modern plant, which as in most similar gamopetalous corrolas is accompanied by a suppression of one or more stamens, was no doubt the result of insect visitation. Observation has shown

that peloria occurs, as a rule, only in the upper flower of the raceme, where there is full chance to expand on every side.

I once had a funny experience with this condition. I had long known of the phenomenon, as it is mentioned and figured in various text books, for instance in Le Maount and Decaisne, but I had never seen it in nature. One day, walking alone on a street in the residence portion of Providence, I saw, in an open, unoccupied lot, a large bed of common toad-flax. With a bit of prescience I said to myself, "'Tis now or never, I'll look for peloria." To my astonishment, I found nearly every plant, a dozen or more, in full peloria, and from that day to this, over twenty years, I've never seen it again. The phenomenon here described occurs in our native *Linaria Canadensis;* in the fox-glove, (*Digitalis purpurea*) and in other figworts. The whole matter is fully discussed and illustrated in Maxwell T. Master's "Vegetable Teratology," pp. 219 to 239 inclusive; also in the Gray's Structural Botany, Vol. I, page 186 and foot-note.—*W. Whitman Bailey, Brown University, Providence, R. I.*

The Direction Taken by Roots.—The roots of plants exhibit many evidences of intelligence that seem entirely out of keeping with their structure and position. The first or tap root invariably starts by the shortest route, straight downward while the secondary roots, as if aware of the plant food in the upper layers of the soil, spread out at right angles to the tap-root. The tap-root, however, will alter its course when its interests prompt, and should there be moisture to the right or left and none below, it will at once turn toward the moisture. The very ability to perceive this difference or to turn at all, would be astonishing if it were not so common. It is of immense advantage to the plant, for without it, the first obstacle met with in the soil would stop further growth of each root. Not all parts of the root possess this ability to turn, but only the parts a short distance back of the root tip. Another illustration of

roots that know how to adapt themselves to circumstances and to the plants' advantage is found in the ceriman (*Monstera deliciosa*) cultivated specimens of which are frequent in conservatories. This climbing arum produces two types of roots. One set grows out from the stem, like the roots of poison ivy and fastens the vine to its support; the other depends straight downward and finally enters the soil and secures more food for the plant. The latter roots often reach a length of more than fifty feet before reaching the earth.

Rapid Growth of Plants.—Sometimes, after a warm spring rain, plants spring up with such rapidity that it is not uncommon to hear it said of them that one can almost see them grow. In high schools and colleges, too, by means of an auxanometer one can almost see plants grow and if he cannot absolutely see the motion, he can in a very short while, by consulting the scale, perceive that growth has actually taken place. This is as near as one can easily get in our latitude to seeing plants grow but in some tropical plants it is not very difficult to actually see stems elongate. The bamboo has been known to grow fifty-seven centimeters or nealy twenty-three inches in a single day or at the average rate of a quarter of an inch in a quarter of an hour. Since plants do not grow at a uniform rate throughout the whole day, but have certain maxima in which most of the growing is done, the elongation of the stem at certain hours is doubtless much more than a quarter of an inch in fifteen minutes, a rate that can actually be perceived.

Scarlet Flowers and Drouth.—It is sometimes said that plants with scarlet flowers stand drought better than others. The British *Gardening World* mentions this and says that there are but two scarlet flowers native to England, the poppy and the scarlet pimpernel, both of which grow best in dry and sunny spots. It will not do, however, to reach a conclusion in such a matter without more facts. The two plants with the

most vivid scarlet flowers in Eastern America, are the cardinal flower (*Lobelia cardinalis*) and the bee balm (*Monarda didyma*). The first when wild is almost invariably found on the banks of river or pond rooting in the mud, and the other is fond of wet spots in meadow and pasture. The painted-cup (*Castillia*) too, is fond of wet meadows. On the other hand, the red or fire lily (*Lilium Philadelphicum*) grows in dry upland woods far from moisture of any kind. Our only red cinquefoil (*Comarum palustre*) is found in deep bogs and so the list runs. Apparently the color in America, at least, is not to be correlated with lack of moisture in the soil.

Cauliflory.—In temperate regions the flowers are so uniformly borne on the young wood that we come to think of them as restricted to such places and it is something of a surprise to find in tropical countries many plants whose flowers and fruits are borne on the trunk instead of the small branches. The cocoa plant from which our cocoa and chocolate come, has this habit and a grove in full fruit looks like a peach orchard with melon-like pods hanging from the trunk and larger branches. Although a tree with its trunk in full bloom is an odd sight to botanists of the temperate zone, the occurrence is not at all mysterious or contrary to plant habits when we come to examine it. As we have stated, the flowers, with us, are borne either on young stems of the year, or on wood that was formed the previous year. The grape is an example of the first and the cherry of the second. In tropical trees that do not require a thick bark to protect the stem, there is no reason why flowers should not occur on the trunk and they are very often found there. They are supposed to be produced by dormant buds and are often restricted to the main stem only. In temperate regions, however, we are not entirely devoid of trees which show a tendency to cauliflory, as the phenomenon is called, for the red-bud (*Cercis Canadensis*) commonly has flowers from branches more than two years old.

EDITORIAL

Most lovers of flowers have heard of the remarkable collection of glass flowers at Harvard University, but many doubtless think as the editor did that they have been greatly over-praised. A visit to the collection, however, will at once dispel this notion. We expected to see some glass models somewhat resembling the living plants, but were quite unprepared for the marvelous exactness of the specimens. It is not an exageration to say that if living plants were laid beside the glass specimens, the real could not be distinguished from the artificial at a distance of a dozen feet. Minute parts such as stamens, styles and hairs, are quite as correctly reproduced as larger ones and the coloring is beyond criticism in most cases. While it is granted that the collection is not of use from the systematic standpoint, we are of the opinion that the flower-lover will find few more interesting objects in Boston and vicinity. The collection now numbers nearly six hundred specimens.

* * *

We probably know more about the first flowers to bloom in New England than of any other section. New England winters are proverbially bleak and the first flowers are therefore all the more welcome, when they do appear, besides there are more botanists in New England to write about their flowers than there are in other sections. But every section has some botanist, though the flowers are not alike, and these botanists are represented among the readers of the BOTANIST. It would be interesting to know what flower is first in each locality and thus we invite each of our readers to send us, on a postal card, an account of their earliest flowers. In the editor's region the first flower is certainly not the trailing arbutus for it does not grow there. Possibly the harbinger-of-spring (*Erigenia*) would be entitled to the award, though *Draba*

Caroliniana is not far behind. Of course the South, West and Northwest have still different species. Can we not have a symposium in some future number of this magazine with regard to the first flowers? Which flower is first? When does it bloom? What is it like? Where does it grow? Is it gathered for bouquets? Has it any other uses? What flower competes with it for first place? What enables it to bloom so early? Has it a store of food? If so, where? The cultivated flowers should be rigorously excluded. Such a symposium would be of much value and we trust our readers will find time to contribute their own observations.

* * *

Through the kindness of Prof. J. Y. Bergen, author of numerous botanical texts, we explored Concord, Massachusetts, last summer, under exceptionally pleasant circumstances. With the crowds of other visitors, we viewed the historic spots about town, including the graves of its famous men, but we were quite as much interested in the original Concord grape-vine, which still climbs over the dwelling of the late Ephraim Bull, its discoverer. Some weeks later, as we stood on the shores of Keuka Lake, and observed the vineyards rising, tier upon tier, from the waters' edge to the hill-tops, and called to mind the vast numbers of these vines stretching away across western New York, northern Ohio and Indiana, not to speak of the countless numbers in other regions, we reflected that this obscure man had possibly done quite as much for the world as his more famous townsmen. Another treat at Concord, was a look at Thoreau's herbarium and some of his manuscripts which with other relics of local interest are preserved in the excellent public library. The herbarium is in good condition and the plants are labelled in Thoreau's handwriting. The covers bear evidences that they were manufactured at home.

BOOKS AND WRITERS.

The appearance of Bergen and Davis' "Laboratory and Field Manual of Botany" Calls attention anew to the excellent series of botanical text books of which it is a part. In the opinion of the reviewer the Bergen texts as they are frequently called, are the very best and most practical books for use in high schools that can be found. The present manual is a laboratory guide for use in connection with Bergen and Davis' "Principles of Botany" issued last year. Both books are designed to cover a year's work and of course follow the modern sequence which begins with the seed and runs through the structure of flowering plants in the first half year and mainly discusses the spore-plants in the second. Very little adverse criticism can be made of the "Principles of Botany." Its treatment of the subject is up to date and it is the only one of the Bergen books that is strictly a text and not partly a laboratory guide. Ecology is treated as a separate branch of botany but in the judgment of the reviewer should be blended with structure, physiology, etc., in a work like this. The new "Laboratory Manual" may appear to many to attempt too much. It is at once a book for use in a half-year or a year's course in the high school and a manual for normal schools and colleges. Such a volume may be confusing to any class without an unusually efficient teacher skilled in the selection of material. The experiments are for the most part illustrative and easily performed but there are several that require longer periods of time for results than seems desirable. In one the student is directed to watch his experiment for a month. It is doubtful if the interest of a high school class in any experiment can be sustained for thirty days. While the fullness of the book will detract in a measure from its usefulness in the high school, it will render it doubly valuable to all teachers. In addition to directions for the study of the entire subject attention is given to culture methods, botanical microtechnique, collection of material, etc. All in all it is a book that few teachers of botany will care to be without.

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CONTENTS

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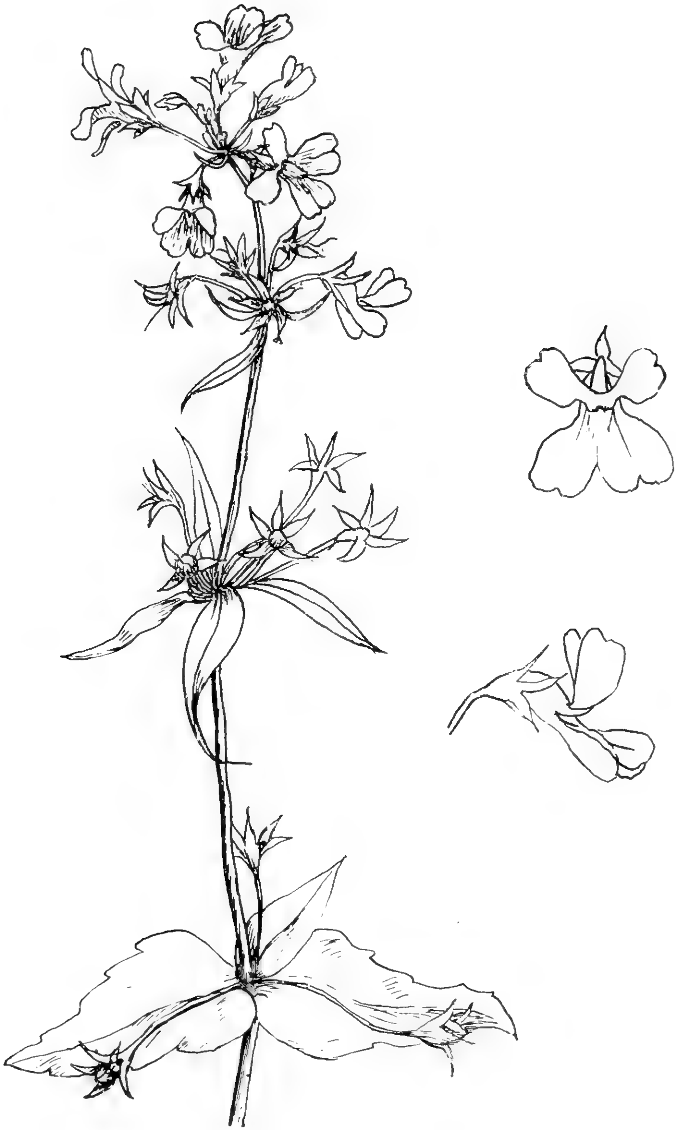

INNOCENCE.—*Collinsia Verna.*

THE AMERICAN BOTANIST

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COLLINSIA VERNA.

BY WILLARD N. CLUTE.

THERE are certain flowers in every locality whose blooming makes so profound an impression upon the season as to eclipse and put into the back-ground all others that chance to open their flowers at the same time. Sometimes it is the whole country-side that is placed under the spell, again it is only the bits of boggy meadow, the thickets or even the roadsides. Some of the flowers of which this is true readily come to mind as daisies, goldenrod, dandelions, buttercups, bluets and lupines. Most of these, however, become cheap and common by reason of a too lavish display of bloom, but this charge can never be honestly brought against the beautiful subject of this sketch which among the children goes by the names of wild for-get-me-not innocence, and blue-eyed Mary and to scientists is known as *Collinsia verna.*

Without having visited Japan we dare say that our woodlands are as well worth a visit at Collinsia season as any oriental wood is when the cherry flowers are unfolding. That we do not make holiday to see this rare sight is a matter of race not of comparative beauty. While the Collinsia is in bloom it is literally true that one cannot enter its favorite haunts without treading on flowers. It is spread as thickly through the woodlands as ever bluets were in a meadow and the two-colored blossoms nodding and swaying in the dappled shade of bush and tree make a sight not soon forgotten.

The flowers are among the oddest of blossoms. They

are two-lipped and at first sight appear to have but four petals each, although the plant is a member of the figwort family where five petals is the rule. Nor does there appear to be either stamens or pistils in the flower until upon further investigation we find the missing petal forming a sac beneath the lower lip and entirely concealing the stamens and pistil. This curious arrangement is an adaptation for cross-pollination and reminds one of similar contrivances in the peas, beans and their allies. That it is successful is shown by the great number of seeds the plant is able to ripen. Another singular feature in the sharp contrast in color between the upper and lower lip. The two upper petals are pure white and the two lower dep blue. Although but four petals are visible it has a very violet-like appearance. The flowers encircle the stem in several successive whorls of about five each and form what someone has characterized as a "many storied flower cluster." The lower circles bloom first and the blooming impulse slowly mounts to the top. There are several other species in the West, but all seem to agree in having bi-colored flowers. Toward the East our common species barely reaches western New York, which botanizers in New England may well regret.

The usual habitat of the plant is in moist woods and not in open meadows as some writers of popular botany, having confused this with the bluet on account of a similarity of common names, would have us believe. Nor are the upper petals blue and the lower ones white as one prominent guide to the wild-flowers asserts. We who know the Collinsia strongly suspect this particular guide to have written up the plant from the Manual and not from specimens. The fanciful nature of blue-eyed Mary is often given in books, but innocence is much better and even this, in common parlance gives way to wild forget-me-not at least in my own region.

LIANES.

BY DR. W. W. BAILEY.

THE Spaniards have a melodious word to designate a peculiar type of plant which reaches its highest development in the tropics, though not unknown elsewhere. The beautiful name *Liane* is applied to the trailing plants of quite diverse families, which, in equatorial forests swing from tree to tree reminding one, according to their size, of the cables or cordage of shipping.

As a rule these free-growing plants are not parasites, that is, they do not prey upon the other trees or shrubs to which they are attached. The true Liane is not even a climber in the botanical significance of that word. It has no tendrils or prehensile stems or roots of any kind, but, in its effort to lift itself out of the struggle below into light and air, it trails over other plants, or mats itself about them. Thus, while, in a sense, fragile itself, it makes stouter plants support it. Indeed, we somtimes find a mass of lianes completely replacing a tree, which it originally merely embraced. Its Laocoon-like clasp, becoming tighter and tighter, and its dense foliage interfering with the natural display of the trees own vegetation, causes the latter's ultimate enfeeblement and death. These false trees, representing others of an utterly different nature that have entirely disappeared, often exhibit superb masses of verdure.

Says Kerner Von Marilaun, the great Vienna botanist, whose word-pictures are among the most graphic of any natural history writer:

"Often it happens that the name of a plant affects our imagination by its pleasing or harmonious sound. One associates with the name not merely the idea of the form of a certain plant, but more than this, its whole surrounding in which it grows and flourishes. One conjures up a picture

of a flowery meadow or scented wood with which the plant with pleasing name can harmonize. It may be some far back reminiscence is bound up with the pretty name, or we have read a vivid description in a book long ago. Thus idealized, one shrinks from approaching it with critical eye, from examining it with knife and microscope, and from classifying and describing it in the dry language of the specialist. I am thinking here specially of the word 'Liane.'" He then proceeds to describe in his own inimitable manner, a scene in an equatorial forest where lianes are a prominent feature.

In such a dense tropical forest, where constant rainfall alternating with powerful sunlight makes vegetation thrive to an extent unknown to us, plants in indescribible confusion are piled up, interwoven and twisted. The enormous trees rise like pillars, while between them swing living ropes, or are stretched bridges of verdure. These lianes are at times so interlaced as to make forest or jungle impenetrable. Green draperies, carpets and curtains, often ablaze with flowers, are the rule, but in tropical woods it is noticed that the blossoming occurs well aloft, and it is there that the gorgeous butterflies and moths, and the transcendent humming-birds, like living gems fly from flower to flower. Here, too, such creatures are more imitative of plants or of each other, than they generally are with us. One may choose an exquisite butterfly, and be almost upon it, when it disappears, and the hunter sees but a dry leaf. If he is led to watch the leaf, suddenly it is again an insect.

A passing breeze sets the lianes swaying and forming swings or hammocks for Ariel or Titania. "In other places they stretch in luxuriant festoons from bough to bough and from tree to tree * * * * there are even actual arcades with pointed and rounded arches. Isolated tree-trunks are transformed into emerald pillars by the crossing of woven lianes, or more frequently become the center of green pyramids over

the summits of which, the crown spreads out in verdant plumes."

The stems themselves are curious objects, twisted like the strands of a cable, coiling like a cork-screw, plaited or flattened like ribbons, pitted or formed into elegant steps, the so-called monkey-ladders. Nor do those frisky athletes neglect them as they scamper about the trees in wild play, using, in American forests only, their prehensile tail as a fifth and most important hand.

Among the massed lianes, is the place to look for aerial orchids, most marvelous of all flowers in form and color. Here too, ferns love to find their "coign of vantage" where, as Bunyan says, the "air is delicate."

Kerner regrets that "the sweet word liane" has not found its way into botanical language, and, practically it has. It orignated, he says in the French Antilles, but has never found its way into most languages. We have seen that it refers to a type, not to any definite family or association of plants. In this view we find some of our own temperate plants falling under the head of lianes, as the very pretty Roxbury waxwork, some jessamines, barberries, and roses. In the tropics, the Bignoniads or plants of the trumpet-creeper family are very typical lianes; so also are certain pipe-vines. These may form huge, stranded cables. Thin cross-sections of small twigs of those, display under the microscope most exquisite patterns and designs. Certain aroids, plants of the Calla family produce long trailing roots, as we know does also the banyan, but these are not lianes. To be such the stem must trail with an upward habit. Such roses as the now familiar crimson rambler, might be called lianes, while our Virginia-creeper, growing by an attachment to a support would not.

Providence, R. I.

AN AFTERNOON IN THE HELDERBERGS.

BY FRANK DOBBIN.

LEAVING Albany shortly after noon, a half hour's ride by train brought us to a small station within walking distance of the range of hills known as the Helderbergs. These hills have given their name to two geologic periods and because of their peculiar formations and the fossils contained in their rocks, they are of special interest to the geologist. However it was not as geologists but as lovers of out-of-door life and students of botany that we essayed their exploration on that March afternoon.

Tramping leisurely upward through the woods which cover the ascent to the cliff, rising eighty to one hundred feet to the level ground above, we made a casual examination of the lichen and moss flora. Here we found the lichen *Biatora vernalis* but little else of special interest. We made our way slowly upward by the side of a mountain torrent which issues from Sutphen's cavern. At the cavern we found on a rock in the bed of the stream that somewhat rare lichen *Placodium elegans*. The stream at this time of the year almost completely fills the mouth of the cave, thus effectually shutting off further exploration in that direction. The cavern is said to have been explored for a distance of two and a half miles.

After a short rest we attempted the last hundred feet of the climb which is by a narrow path up the face of the cliff. Just then the path was filled by the remains of the winter's drifts through which we were obliged to stamp a path, one step at a time. Reaching the top at last through a narrow crack, which might aptly be termed "fat man's misery," I was surprised to find cultivated fields to the very verge of the precipice; some of them containing fine orchards of pear and apple trees. Indeed this whole region seems to be well adapted to fruit growing.

About a mile from where we reached the top we found growing on the edge of the precipice the moss *Hylocomnium* (*Hypnum*) *rugosum*. This spot is one of the few known stations for this rare moss in the state. The bear berry, *Arctostaphylos Uva-Ursi*, grows here in abundance, forming dense mats on the brow of the cliffs. Other mosses found were *Anomodon viticulosus*, *Raphidostegium cylindrocarpum*, and *Thuidium abietinum*.

After lingering for a while to gaze at the beautiful waterfalls formed by the melting snows in the fields above the cliffs we slowly took our way downward by a different path than that by which we had ascended. Here I collected my first wall rue, *Asplenium Ruta-muraria*, and was surprised and pleased to learn that this was a new station for eastern New York.

Many fossils are to be found about the cliffs, mostly certain crinoids and fossil shells of *Pentamerus galeatus*, more or less perfect. We recalled our half-forgotten geology enough to recognize some of them and others were carried away to be farther studied with the aid of a text book.

A downward plunge of several hundred feet was made by hanging on to bushes which grew beside what might by courtesy be called a path. However it was a short cut and saved us two miles of hard walking. Twilight found us hurrying to the little station to catch a later train to the city, well pleased with our afternoon tramp in the Helderbergs.

Shushan, N. Y.

OUR BIRD'S NEST FUNGI.

IT is probable that most lovers of out-doors have seen at one time or another various species of our bird's-nest fungi. They are not uncommon on the earth or on old logs and look like little cups or vases, less than an inch high filled with small roundish balls. These cups are known as the peridia

of the fungus and the small balls are peridioles. The likeness of the two to a nest with eggs has given the common name to the group.

In our species each peridiole is attached to the peridiun by a slender cord or funiculus which when wet becomes very elastic. The peridioles are filled with microscopic spores and these latter furnish characters by which mycologists distinguish the plants. They are not difficult to distinguish from one another, and we condense the following account of our four common species from the December number of "Mycological Notes."

Crucibulum vulgare is usually found on sticks, chips, etc. The cups are subcylindrical in shape and less tapering than in other members of this group. The color when young is yellowish and this is the only species of this color. When old the cups bleach out. In young specimens, the mouths of the peridia are covered with a thin yellowish membrane called the epiphragm. The peridioles are white and this is the only one of the bird's-nest fungi that has white eggs.

Cyathus striatus is usually found on sticks but sometimes on the ground, in the latter case attached to buried sticks. While *Crucibulum vulgare* has more of a "domestic" nature, being found often around houses, on chips in the wood-yard, on board walks, etc., *Cyathus striatus* has more of a wild nature and is generally found in the woods on brush-heaps, etc. It can always be known by the striations or lines on the inside of the cups. *Cyathus striatus* is the only species in th United States or Europe that has these marks. The color of the cups is dark brown or black and the European plant is darker than the American. The latter is sometimes known as the variety *Schweinitzii*. The peridioles of *C, striatus* only fill the lower part of the cup below the striations. They have a thin whitish surrounding membrane or tunica, but the eggs would be called black. *C. striatus* is easily recognized by its striations.

Cyathus vernicosus is the only species likely to be found growing in unmanured ground. Sometimes it is attached to buried sticks, but it rarely if ever grows on wood as the other species do. Like *C. striatus* it is of a wild nature, being found usually on bare ground in fields, borders of woods and similar places. It is readily known by the cups which are thicker, firmer, more flaring, smooth inside and smoother outside than the other species. The eggs or peridioles are black though covered with a thin white membrane and are much larger than any other species known.

Cyathus stercoreus is a manure loving species and is usually found in manured ground such as lawns, gardens, fields, etc. The cups are even inside and with shaggy hairs outside. When old they become smoother and are sometimes mistaken for *C. vernicosus*. When once learned,however, the plants can readily be distinguished by the cups. The peridioles have no membrane whatever, hence they are blacker than any other species. They are about twice as large as those of *C. vernicosus*. The first three species are usually abundant both in Europe and the United States but *C. stercoreus* while common in the United States is very rare in Europe.

AERENCHYMA.—One of the least known of plant tissues is that which goes by the name of aerenchyma. As its name indicates it is an aerating system being composed of large thin-walled cells with large intercellular spaces. It is comparable to cork but unlike cork the cells contain no deposit of suberin. Aerenchyma is usually if not always confined to water plants. Sometimes it is found only at the lenticels, but at others it forms a thick covering on submerged stems entirely replacing the bark. Probably no plant in our flora better illustrates aerenchyma than the water willow or swamp loosestrife (*Decodon verticillatus*). In this plant it is often an inch in thickness.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

CROTON TINCTORUM.—A little known and interesting industry of the south of France is the culture of great quantities of this little cottony, ash-white stiff-stemmed annual, the dried plants of which are shipped by boat-loads to Holland. The Dutch extract from the leaves and fruits the red dye with which their ball-shaped cheeses are colored. This croton has nothing in common with our ornamental greenhouse crotons. —*Gardening World.*

VITALITY OF SEEDS.—The opinion is pretty general that some seeds may retain their vitality for centuries. Botanists usually scout the idea that seeds that have lain so long dormant will grow, but they are not always able to refute the statements that plants have been raised from such seeds. Occasionally a newspaper yarn whose verisimilude is such that the general public readily believes it, will recount the raising of corn from seeds found buried with a mound-builder, or the growth of wheat found entombed with an Egyptian mummy, but in cases where plants have apparently been produced from such seeds it is usual to find that the claim in which the seeds were found had been "salted." Maize or Indian corn was unknown to the Egyptians, and when a gullible American is able to raise maize from seeds found with a mummy in Egypt the circumstantial evidence is pretty strong that he has been

fooled. On the other hand botanists have not been wanting who believed that seeds occasionally germinate after long periods of time. *Gardening World* quotes Dr. Lindley the well known British botanist as follows: "I have at this moment three plants of raspberries raised from seeds taken from the stomach of a man whose skeleton was found 30 feet below the surface of the earth at the bottom of a barrow which was opened near Dorchester (England). He had been buried with some coins of the emperor Hadrian and it is therefore probable that the seeds were 1,600 or 1,700 years old."

A YELLOW TRILLIUM.—Yesterday while on an excursion to the woods with my class we came across a *Trillium* of a shade of color which I had never seen before and which it would appear has never been seen before by any one in this part of the country. The inner three leaves of the perianth were wholly a pure sulphur yellow, the outer leaves of the perianth were pale green below but as bright a yellow above as the inner part of the perianth. The other parts were normal in color and size. The flower was a newly opened one and grew amongst a larger number of specimens of *Trillium grandiflorum*. The peculiarity of color struck me as being so unusual that I want to inquire if any of the readers of THE AMERICAN BOTANIST have come across a similar freak in color.—*R. S. Hamilton, Galt, Ontario, Canada.* [The new botany is vitally concerned with these curious plants which systematic botanists are too often inclined to dismiss as mere freaks. The editor of this magazine is gradually assembling a living collection of these and will welcome additions of anything unusual. Botanizers who come upon any of these "freaks" are urged to remove them to their gardens for further observation. In cases where the plant is difficult to remove, seeds from the aberrant plant will usually produce the same form. Starting with one of these strange departures from the

normal, and continuing to encourage its peculiarities, it is quite possible to breed up a pure strain very different from the original. In these sudden changes of color, leaf form, shape of petal, or doubling of parts, we see one of the mutations of which present day evolutionists make so much. At some future date, the editor hopes to give an account of some of these oddities in his own collection.—Ed.]

Seed Stalk of Black Acacia.—Nature does some things with such exactness that we must always marvel at them. One may be justified in saying that nature can count for she rarely makes a mistake in the proper number of parts to the flower, whether it be five-parted, three-parted or composed of some other number. She always hangs out the same kind of flowers in exactly the same way and practically never gets pansies or sweet-peas upside down. A further instance of this exactness may be seen in the seed stalk or funiculus of the black acacia of California to which our attention has been directed by Dr. W. W. Munson. Our thanks are also due to him for the material for the accompanying illustration. In this acacia the seed stalk is unusually long and makes two nearly complete folds about the seed. One might think that with so many seeds to look after, nature might be excused for an occasional slip but such slips practically never occur. Each seed stalk upon leaving the seed passes half-way around it, then doubles back on itself and goes around the seed until it nearly meets the first turn after which it again bends back and is attached to the pod. The length of the seed-stalk itself, is remarkable. There are few genera of plants that can match it in this respect. The magnolia family has something similar, but here the seed stalk is more delicate and is coiled or folded within the pulp that encloses the seed.

Ants and Seed-Dispersal.—We seldom think of insects as distributors of seeds of plants. In the arrangements for pollination insects hold first place, but the plants usually bid for larger assistants, such as mammals and birds when their seeds are to be scattered. There are very many adaptations in the fruits of plants that make the conclusion irresistable that they were intended to entice animals to distribute the seeds. Few if any modifications which would cause seeds to be distributed by ants have been noted though some are inclined to think the caruncle of seeds like the bloodroot is an adaptation to make them easy for the ants to grasp. It is well known, however, that ants are great gatherers of seeds. The most of these are carried off and eaten, but probably as great a proportion are dropped and forgotten as of the hickory nuts carried off by the squirrels. Among the seeds that ants are most fond of may be mentioned shepherd's purse, chickweed, fumitory, nettle, snap-dragon, flax, cress, pigweed and various grasses.

Heliotropism of the Water Fern.—The curious fact that the water fern (*Marsilia*) like the clover and oxalis, closes its leaves at night, has long been known, but Robert F. Griggs has recently noted what appears to be a new motion of the leaves to enable them to face the sun. Thus far the habit has been noticed in but one species, *M. vestita,* but it is likely that other species may be found to act in the same way. According to the writer quoted, the leaves at evening squarely face the west, while shortly after sunrise they will be found to face the east. The movement seem to be produced by the petiolules of the individual leaflets, rather than by the petiole of the leaf. The motion which causes the closing of the leaves at night is also located in the petiolules. One striking difference between the night position of marsilia and oxalis leaves is that in the former the leaflets are erect and in the latter the

leaflets droop. The explanation for this seems to be a physiological one. In the oxalis the stomata, or openings through the epidermis, are mostly on the under surface, and the drooping position of the leaflets protects them through the night. The stomata of marsilia, on the other hand, are mostly on the upper surface, and the leaflets naturally bring their upper surfaces together in the night position.—*Fern Bulletin.*

PLANT DISTRIBUTION.—It is often a narrow line that prevents some cultivated plants from becoming weeds. If petunia, tomatoes, pumpkins and other food-plants of tropical origin could survive our winters we might soon find it necessary to hoe them out of spots in the garden where they were not wanted. These plants, however, cannot usually get through our winter even in the seed. An illustration of what might happen if they could is found in an insignificant Mexican weed, *Galinsoga parviflora,* that has slowly invaded the United States. The mature plants cannot endure our winters, but the seeds can and as a consequence the plant is steadily increasing its territory. Doubtless there are other plants of this character, the jewel-weeds (*Impatiens*) for instance.

POLLINATION IN EVENING PRIMROSE.—It will probably take several generations of botanist gardeners to correctly interpret even half of the peculiarities possessed by plants. Darwin's theory of evolution by slow gradations made it necessary to account for every thorn and prickle, every shape and turn of a leaf and all color, and as a consequence the literature of botany since Darwin's time has been full of explanations that in the light of our present knowledge do not explain. The thorns of the hawthorn do not appear to be necessary to the preservation of the species, nor does any significance appear to attach to the color of the juice of the poppy-worts. The foregoing has been suggested by an observation of De

Vries in his "Plant Breeding." The common evening primrose (*Oenothera biennis*) has an elaborate arrangement for cross-polination, including odor, nectar, color and the ripening of stamen and stigma at different times as well as a difference in position of stamen and carpel, and yet De Vries finds in some specimens that the stamens pollinate the stigmas in the bud and the corollas may even fall off without expanding. All the odor, color, nectar, etc., of such flowers is superfluous and goes to waste. Just as we have figured out how the flower acts, it acts differently!

Fruit and Temperature.—It is usual to think of fruits in connection with the warmer part of the year, but it would be more correct to connect them with a cooler season. In fact, low temperatures favor fruiting. Although many of our fruits do not mature until summer or autumn they are nearly all begun, that is, the flowers nearly always appear, in the cold spring months. Our apples, peaches, cherries, plums, strawberries, currants, etc., all bloom so early in the year that they are likely to get nipped by a late frost. The crocus and other bulbous plants also refuse to send up their flower-spikes if kept in too high a temperature. When the apple tree is transplanted to warmer lands it may continue to grow, but it soon refuses to produce fruits because the temperature does not go low enough to induce blooming.

Bracken Protected by Law.—In America the bracken (*Pteris aquilina*) receives scant attention from the land-owner, who probably never thinks of it unless he is devising a way of eradicating it from his fields. In England, however, the case is different, as indicated by the following communication recently published in *Gardening World*: "I have read with considerable surprise a letter in your issue to-day on the subject of utilizing the young shoots of bracken as food. Your cor-

respondent does not mention the locality in which she resides, which may differ materially from others, but here in Banstead, and for many miles around, the young bracken shoots are protected by very stringent laws, inflicting a heavy fine on any person cutting or mutilating the bracken before notice allowing them to do so is issued. This generally appears about the middle of September. The bracken is then dry and of a beautiful golden brown and then any person can cut any quantity he pleases." The usual fine is $25.00 and costs. The correspondent does not indicate the uses to which the bracken is put, but it is probably used in packing vegetables and protecting tender plants outdoors, much as straw is used in America.—*Fern Bulletin.*

Changes in Nomenclature.—Those who are always ready to adopt the latest fad cannot understand why conservative botanists object to changing the names of plants. The fact is, however, that the names of plants cannot be changed without working much mischief to the literature of botany. The monumental works of Darwin, Kerner, Schimper and many others use what is now-a-days termed a conservative nomenclature. Books on medicine and pharmacognosy adopt the same nomenclature and even the drugs of the pharmacist are labeled in the same way. In a few years, if all the proposed changes are adopted, druggist, scientist, physician and student cannot understand these invaluable books without a glossary or a knowledge of the two styles of nomenclature. And upon what ground are we asked to adopt new names? Simply in order to conform to somebody's "system" or to honor some dead-and-gone botanist who failed of recognition in his own day. We shall continue to maintain that the name of a plant is of no significance beyond being a convenient and universally understood term to indicate it and the less it is changed, the better.

New Races of Plants.—It has been shown by Prof. G. Klebo of Germany, that remarkable metamorphoses can be produced in plants by artificial methods of cultivation. From several remarkable results obtained by him from experiments with *Veronica chamoedrys* and other plants he expresses the opinion that new races can arise as a result of changes in external conditions.—*Gardening World.*

Edible Ferns.—Prominent amongst the grand display of ferns at the exhibition of the Royal Botanic Society of London on April 24th were specimens of the pithy cyathea (*C. medullaris*) a noble species from the Pacific Isles of a comparatively hardy character. This greenhouse evergreen tree-fern forms in its native country a common article of food with the natives. The roots and the lower parts of the stem are soft and pulpy and have a pleasant smell and taste, so that the medulla of this fern, which abounds in a reddish glutinous juice is nearly as good as sago. The silver tree fern (*C. dealbata*) a beautiful species from New Zealand is said to be eaten in the same way. *Alsophila excelsa* and *A. australis* are two magnificent umbrageous trees belonging to an allied genus. The middle of these trees from the root to the apex consists of a white substance resembling a yam and which tastes like turnip.—*Gardening World.*

The Defenses of the Cactus.—When we think of the means by which plants protect themselves from their enemies, the cactus at once comes to mind as a striking example. Although the regions in which cacti grow are veritable deserts for much of the year subjected to great heat and devoid of rain-fall, the plants themselves are usually thick and succulent, and would be toothsome morsels for the animals of the desert but for the terrible armor of thorns and spines with which nature has equipped them. Man is about the only ani-

mal that the cactus cannot repel with spines. When thirsty he is not averse to slicing off the top of the bisnaga (*Echinocactus Emoryi*) and obtaining a good drink of not unpalatable water. There are other cacti, however, with spines small or absent entirely and at first glance one is inclined to wonder why these have not long ago been devoured. Investigation shows that their immunity is due to the possession of bitter or poisonous juices. These latter species, then are even more successful than the spiny forms for they protect their juices from even the lord of creation himself.

Drouth and Cold.—The physiological effects of drouth and cold are very similar. Drouth hastens the fall of the leaf just as cold does. Plants, such as pines, which do not cast off their leaves in winter, are often found both in cold and warm climates and in both they have the same needle-like leaves adapted to retard transpiration. A search for the cause of such adaptations in different climates reveals the fact that the southern pines dwell in soils that are physically dry, while the northern pines grow in soils that for part of the year are physiologically dry through cold. Plants are as likely to cast their leaves in a dry season in the tropics as they are at the approach of winter in the temperate zones.

Origin of Floral Numbers.—Take a straight vigorous twig of any alternate leaved plant and beginning at one of the lower nodes, pass a piece of twine from leaf to leaf up the stem. In all normal specimens it will be found that the leaves have a very definite position on the stem. The twine may pass one or more times around the stem before coming to a second leaf that is exactly over the one selected at the beginning, but in all cases, the leaves are arranged alike in the same species. In a large number of cases the twine goes round the stem twice and passes five leaves or buds before coming to

a leaf directly over the first. In others the twine goes around but once and the fourth leaf is over the first. Now looking down on the end of the stem or sighting along it, we see in the first instance that the leaves are arranged in five longitudinal rows, and in the second they are arranged in three. From the fact that five and three are numbers so characteristic of the parts of flowers, it is assumed that the flowers also correspond to the arrangement of the leaves, the principal difference being that the leaves are arranged in an ascending spiral, while the floral parts are in circles. Sometimes, however, as in the magnolia, even the floral parts are in spirals.

THE WAY WOODBINE CLIMBS.—The books are full of instances in which an error once made in print is repeated again and again by authors too indolent to examine for themselves. One of these relates to the Virginia creeper or woodbine (*Ampelopsis quinquefolia*). Several books examined recently aver that this vine climbs by means of adhesive disks on the end of its tendrils. Other books assert that the tendrils twine as do the tendrils of the grape. The writer of this paragraph contends, however, that both are wrong, for the woodbine not only has twining tendrils but it has adhesive disks as well. In some regions but one form is found; in others, both occur. The question then arises, shall we call each form an "elementary species" or are the two forms interchangeable? Not much is known about the distribution of the two forms and here is a case in which everybody who knows this common vine may be of use to science by recording the form or forms that grow in his own locality. But who can say, off-hand, which form is found in his locality? It is easy to see that even familiar species have many unknown points about them. It would be interesting to grow the two forms side by side for comparison. We expect to do this and hope to report conclusions later.

Origin of the Cut-leaved Sumac.—In extensive decorative plantings one may occasionally find a shrub that is evidently a sumac, but with leaves so fern-like as to make the plant quite unlike any native species. According to *Parks Floral Magazine*, however, this cut-leaved form is merely a sport from one of our common sumacs and was found some years ago growing wild in Chester County, Pa. It is said to be seedless but is easily propagated from root-cuttings. Now and then nature inspires some plant to put forth something new, and if the new form happens to be useful for decoration or for food, it may make a fortune for the discoverer. Several of the cultivated blackberries are simply especially luscious forms of the common wild species, and the well-known concord grape is also a sport of a native vine.

Dandelions as Food.—As a nation we have not yet taken up the cultivation of the dandelion in earnest—possibly because it grows with us all too freely without cultivation—but this despised weed seems to be steadily gaining ground as an edible and in the Old World is frequently cultivated. In the markets of our larger cities the cultivated dandelion is often exposed for sale while in smaller towns the plants that grow so profusely in waste grounds are not disdained. Dandelion greens furnish many a healthful meal to the foreign part of our population every spring. But even in so apparently simple a matter as cooking dandelions there seems to be some tricks. The majority simply cut off the leaves, wash them and cook until tender. A better way is to select the large plants and after digging remove most of the green part of the leaves and all of the root except just enough to hold the leaves together. The lower part of the leaves are blanched from being in the ground and are sweet and tender. They should be washed thoroughly, parboiled for a few minutes and then cooked as usual. They may be served with mayonnaise

dressing or in any other way preferred. Such a dish is a great improvement upon the old fashioned dandelion greens. The time-honored custom of using a kitchen knife for digging the plants may be abandoned. A spade is much better.

MUSTARD AS A POT-HERB.—The entire cress family to which the mustards belong, have certain qualities that make them eminently fitted for the table. We have but to recall the fact that the water-cress, turnip, radish, cauliflower, kale, cabbage, brussels sprouts, horseradish and pepper-grass also belong to this family to realize how useful it is. Some species, however, have become troublesome weeds, for instance wild mustard or charlock (*Brassica sinapistrum*). An acquaintance of the editor's whose garden is badly infested with this weed has made a virtue of necessity by setting apart the worst corner of the garden for a mustard bed and regularly harvesting the crop which is cooked like any other pot-herb. There is an old saying that "one year's weed makes seven years seed" meaning that it takes seven years to get rid of the seedlings from one crop of weeds. This particular garden spot seems to have had several years weed to judge from the number of seedlings, but the owner counts this an advantage and looks for a supply of palatable greens for the entire summer. The charlock is especially harmful to grain fields in this country but if we should all begin eating it, it would doubtless soon be as difficult to raise and develop as many insect and fungous foes as any other inhabitant of the garden.

EDITORIAL

The fourth season of work in Nature-Study at the Connecticut State Chatauqua begins July 12th at Plainville, Connecticut. The Nature Study is under the direction of the editor of this magaziné and consists of a daily talk on out-door subjects followed by an excursion in wood and field. From a small beginning this department of the Chatauqua has grown to be one of the most important, and those who would like one or two weeks outing in the woods with a company of people interested in birds, flowers, etc., are invited to investigate its merits. The expenses are low and the accommodations good. Those who wish further information may address The Connecticut Chatauqua Association, 411 Windsor Ave., Hartford, Conn.

* * *

Before Bishop Vincent attained his present eminence he was for some time the minister in one of Joliet's churches. Recently at an anniversary of the church, the Bishop preached a sermon from which we cull the following extract. While not strictly botanical, it voices so nearly the things for which the journal stands that we are sure it is worthy of a wider audience:

"He is a wise man who resolves to live, whatever his occupation, in the widest sphere of life possible to him. Books give vision and vistas to men. Books make men travelers. Books turn ordinary men into scientists, philosophers and the companions of poets and sages. I pity little narrow limited shut in and shut up souls who toil and tramp and dicker and bargain, and eat and drink and sleep, and die, having neglected this packed and glorious universe of sights and sounds of science and splendor all about them—calling to them, beckon-

ing to them, trying to win their attention and allure them to accept their inheritance. I am specially discouraged over a class of Christian believers who are contented to live in comparative ignorance when they live in the center of all kinship. Music allures, science invites, art beckons, literature urges, religion pleads, astronomy flings out her radiant beams but they answer 'No, business calls me, my dinner bell rings, or I must sleep, let me alone.' "

BOOKS AND WRITERS.

Several years ago, G. Frederick Schwarz, author of "Forest Trees and Forest Scenery" set about an investigation of one of the southern pines which forms much of the forest from North Carolina to Louisiana, and the results of his observations have recently appeared in the form of a small book on the "Long-leaf Pine in Virgin Forest" from the press of John Wiley & Sons, New York. The book will be a mine of information to foresters, lumbermen, and owners of southern timber-lands, and is not without its value to the ordinary botanizer who may recognize young specimens of this tree in among the Christmas decorations of the Northern States. Thus far, few trees have been considered of enough importance to merit an entire book devoted to them. The book includes twenty-three illustrations from photographs, and 127 pages of text. The price is $1.25 net.

Every time a new gardening book appears it seems as if nobody would have the courage to write another because the field is already so well occupied. Two new candidates for the favor of gardeners have recently appeared, however, and apparently cover new ground. The two might be called companion volumes though written by different people and issue by different publishers. The first is French's "The Book of Vegetables" and the second Sedgwick's "The Garden Month by Month." The reviewer, who has a garden of his own,

has made almost constant use of the "Book of Vegetables" since it appeared. A more usable volume for the amateur would be hard to find. Practically everything grown in American gardens is given a place and as the subjects are arranged alphabetically any information one is looking for is soon forth coming. After a short general discussion of a plant there follows very definite information on soil, how and when to sow, thinning, transplanting, cultivating, fertilizing, harvesting, storing, plant diseases, etc., etc. The book is a well illustrated 12mo. running to 300 pages and is issued by the MacMillan Company at $1.75 net. We wish somebody would make a similar book of annual flowers, and another of perennials.

The "Garden Month by Month" is a usable book of another kind. It is devoted to flowering plants, but is not so much interested in recommending special flowers for cultivation as in offering to the amateur information as to color, height and time of blooming of the hardy perennials. From this array it is expected that the gardener will be able to select his plants, as an artist selects his colors, and therewith paint his border and beds in any color or combination of colors desired. The flowers of every month from March to September are thus treated, all the flowers of each color being listed together, so that if one chooses to have a certain border blue or red in June for instance a very short reference to the book will give all the species available for the work together with their common and scientific names, height and requirements as to shade and soil, their usual season of bloom, description of the flowers, how propagated, etc. The book is a fine specimen of the printers art, and contains more than 500 octavo pages and 150 superb illustrations. A color chart illustrating 63 named colors with which the colors of the flowers treated have been compared, makes possible an exact selection of flower colors. (New York, The F. A. Stokes Co., $4.00 net.)

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CONTENTS

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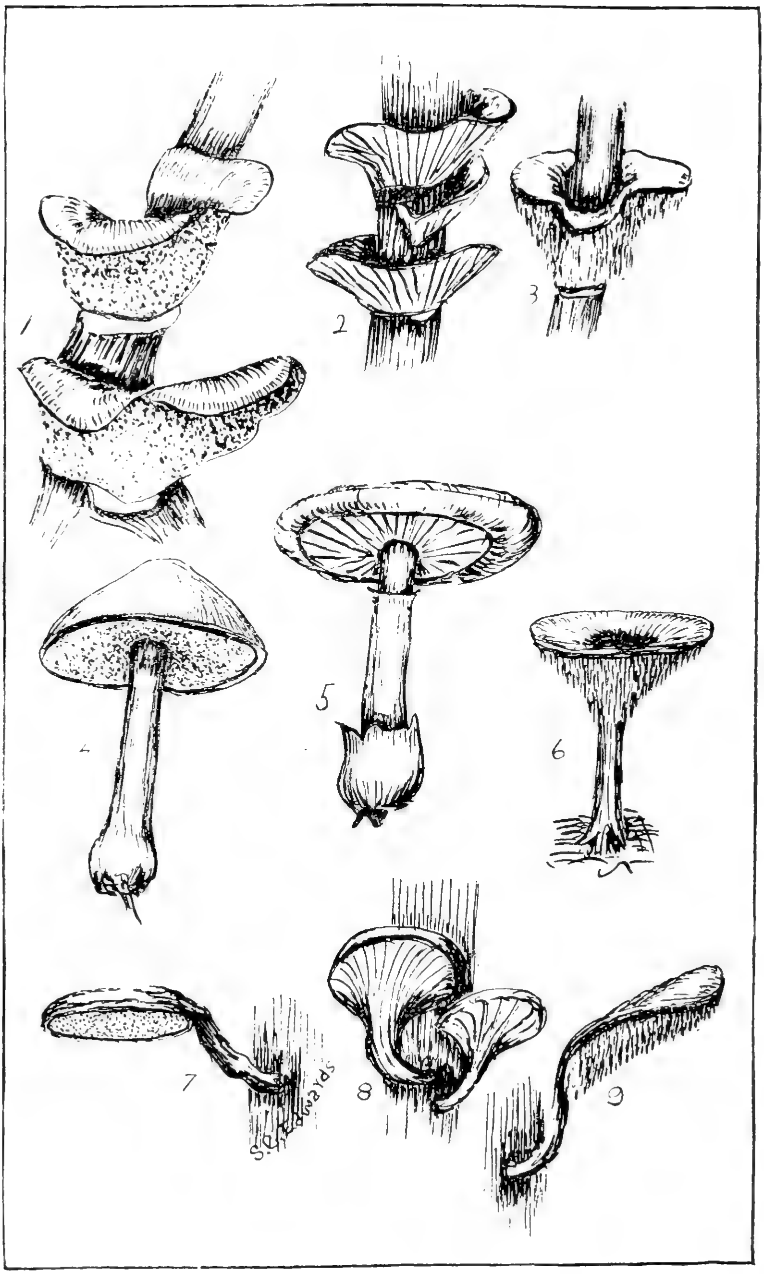

FORMS OF FUNGI.

THE AMERICAN BOTANIST

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WHY AND HOW TO BEGIN STUDY OF FUNGI.

BY STAFFORD C. EDWARDS.

NEARLY every one enjoys a walk in the fields and woods. If we ask ourselves concerning the pleasure thus derived, we would doubtless conclude that we are attracted by feeling the soft earth and leaves under our feet, by smelling the delightfully cool and fragrant air, by seeing the delicate plants just from nature's workshop, as yet unharmed by rude and vulgar contact, other plants perchance not seen by us before, and in other places great logs and stumps in the natural process of decay, untouched by the ravages of fire, a clean example of natural return to elements from which it was constructed. If we see a beautiful bird and hear some of nature's sweetest music, so much is added to the total recompense for the walk.

To those brought up in the noisy, dusty city, and unaccustomed to the "lonely" woods, the interest is but fleeting and shallow. To pick a few blossoms and leaves, soon to be thrown away, to throw stones at a few frogs and birds, and perhaps to climb a tree, these are the round of amusements afforded by the woods. To the one who has learned to "see" things when abroad, the ramble over hills and among the trees has quite a different meaning. If we are acquainted with ten plants we meet, if we know the names of the trees, if we notice several kinds of rocks, if we have seen among the birds some that we know, we have met so many old friends welcome and charming. We are still more delighted to meet a new friend if one concerning which we have heard or read presents himself among those already known. Any one who

has experienced these pleasures can readily understand why the naturalist does not need the company of his fellow man for long periods at a time to make his happiness.

A city bred person often does not contemplate with pleasure the prospect of a forced sojourn in the country. He does not know how to amuse himself. He does not have the advantage with the naturalist of meeting on every hand, so many of his friends. We can not all hope to become naturalists but the more of the out-of-door friends we claim as our own the greater pleasure is ours each time we go afield.

Probably many who are in the habit of taking strolls in the woods and meadows, and who derive much pleasure there in meeting known friends, have seen the plants of various form and color commonly called "toadstools." With this practical designation, the whole class has been passed by. I would that more know how easy it is to make these humble members our cherished friends though lowly they may be in the scale of plant life.

Exclusive of puffballs, the most common fungi met with in field and wood may be readily placed by the ordinary observer into one of four classes. By examining the underside of the fungus when found, it will be seen to possess either pores, very small, yet easily seen with the unaided eye, or gills, or spines or a smooth surface. Probably the greater part found will be of the first class. The fungus having pores may be shelving out from the side of a log or stump (fig. 1.) or it may have a central stem like the common mushroom (fig. 4) or again it may have a lateral stem as is in figure 7. The pore fungi constitutes a very large order, which order contains some of the fungi most commonly met. But for the beginner it should suffice simply to know the pore bearing from the others.

The fungi having gills to be the most commonly observed are the central stemmed ones (fig. 5) and one other variety of

the shelving kind (fig. 2). Then those will be found that seem to partake of both characteristics, gills and pores called daedaloid, meaning ornamental, the most common one growing on oak stumps and logs, having gill-like channels, the walls of which are connected by partitions at irregular intervals or so closely together that the surface resembles the first class in being porous.

The next class to be observed with ordinary frequency are those fungi whose spore bearing surface is smooth. Where pores or gills appeared in the former named classes the under surface is unbroken by channel or tube. The Stereums (meaning smooth) are mostly of the bracket type and closely resemble on the upper surface some of the common porous varieties.

The fourth great class of fungi to be mentioned here are those whose spore bearing surface is covered with spines or teeth. The Hydnums (meaning spine bearing) may be found in nearly every shape, central stemmed (fig. 6) side stemmed (fig. 9) shelving (fig. 3) or in irregular masses.

After noting the above mentioned four types of spore bearing surface, the beginner can give attention to the appearance of the upper surface of the various forms of fungi. They may be smooth and papery, or minutely hairy or with a coarse, wooly covering, or again with fibrous scales. In color the dull browns, perhaps, predominate, but fungi may be found with almost any color—red, purple, yellow, green, white, or black. These colors may be evenly distributed over the surface or displayed in concentric or radial bands.

In texture, fungi may vary from the very hard woody ones, through various grades of tough leathery forms, to the fleshy and spongy varieties, even to jelly-like masses.

Fungi with stems may be easily separated into several classes by noting a few very plain features. In some the gills run part way down the stem, in others they may be notched

so as not to touch the stem at all. The stem may be fleshy or fibrous, solid or hollow, adorned with a ring around the top, or inserted in a cup at the base, or both the last named features may be present in the one specimen,—in which case beware!

Every one accustomed to the woods knows that fungi may be found almost anywhere, in the meadows, in old pastures, about old buildings, among shady bushes, in the deepest woodlands, on the ground and on wood in all stages of decay. It is a matter of equally common observation that fungi grow most abundantly during the cooler months, even into the depths of winter. On the fifteenth of January last I gathered a large pan full of the savory oyster mushrooms.

To those interested in fungi otherwise than from a botanical standpoint, the first question presenting itself is how to tell the ones good to eat. To answer the question by a simple rule for determining would immediately brand its author as an unreliable guide in the matter. The only rule I ever heard which seems to be thoroughly reliable is, "Eat them and if you live they are edible, and if you die they are poisonous." Since mushrooms are not a necessity, to the average person, the application of the above rule seems hardly practical. One should know mushrooms before attempting to eat them. Many varieties are good eating and truly a great delicacy, others are harmless and without flavor, while some few are extremely poisonous. If one is interested from the culinary standpoint, a little patient observation, together with study of a good book on the subject will give much of the desired information and incidentally reveal a new pleasure.

New Brighton, N. Y.

WAYSIDE FLOWERS.

BY DR. W. W. BAILEY.

ANY country may be known by its wayside flowers. The hedges and copses along the highways and paths of England show a peculiar flora. Those of Germany, France, Italy or Spain are again distinctive. Quite different are these as a rule from ours, although, as the home of the immigrant from all lands, one finds here a cosmopolitan collection. This is true, however, only near the cities; in the country American plants predominate.

British flowers have become a sacred part of English literature. From Chancer and the older bards, down to Mathew Arnold and Tennyson, the poets have revelled in them. Who does not know cowslips, oxlips, primroses, fox-gloves, cuckoo-pint and Canterbury-bells; daisy and dandelion, thyme, Marjoran and

> "All the idle needs that grow
> In life's sustaining fields?"

Our own wild flowers too have been chronicled in sweet verse by Longfellow, Bryant, Lowell, Emerson, Thoreau, Whittier, and Holmes.

Of course the kind of flowers found by the highway will vary with the season. In June we notice the broad cymes of elder, like some rich and mellow point lace, creamy with age. Reflected in the still water it is very lovely. Wayside meadows are studded with Rudbeckias—"black-eyed Susans," very splendid. Another field may be white with oxeyes, a billowy sea of foam. In low moist places one observes the dainty Pogonia, an orchid pink in hue and fragrant of violets. Do not mistake it for Arethusa, so like yet different. The latter is odorless and of deeper color; leafless too, while Pogonia has one leaf half-way of the stem. Calopogon, another orchid, is near it, peculiar for its erect crested lip. Usually it bears several magenta colored flowers. This is a tint esteemed by nature, and, as a rule, abhorred by man.

Here too, may be found the round leaved sun-dew, carnivorous in habit, a plant about which much has been written by Erasmus Darwin, his distinguished grandson, and other noted observers.

One notices in the fields tall and slender spikes of the blue lobelia, garnet gems of Deptford pink, and yellow stars of St. Johnswort. Nature is especially fond of yellow, and keeps something of that hue all summer. Thus in some sections the roadside will show in succession, coltsfoot, ragwort, St. Johnswort, yellow-topped chrysopsis, pretty little sensitive plants, autumn dandelions, and last of all, golden-rods. Thus is she lavish of her gold.

A very pretty and delicate wayside flower of midsummer is meadow beauty, *Rhexia,* with its peculiar funnel-like stames, and four crimson petals. We may note, too, fine tufts of white meadow rue, groups of yellow, red, and orange lilies, slender blue iris, viburnums, cornels and button-ball.

Few people seem to know how many and varied are our clovers. Besides the fine old familiar dark red one, of forage fame, there is the little running white one, the lovely pink alsike, the Hungarian with its crimson pompon, and the two yellow hop clovers. Then, in dry districts rabbits-foot is common, with calyx teeth silken and feathery. It is a dainty little plant, like most of its kind adventive from Europe. Do not mistake the lucerne medick and alfalfa for clovers, nor yet the melilots white and yellow. They are of close affiliation, but have pinnately compound instead of palmate leases.

Surely any record of wayside flowers would be incomplete that omitted the wild roses, raspberries and brambles.

"Thy fruit full well the school-boy knows,
Wild bramble of the brake,
Then put thee forth thy small white rose,
I love it for his sake.

Though woodbines flaunt and roses glow
O'er all the fragrant bowers,
Thou needs't not be ashamed to show
Thy satin-threaded flowers.

One can hardly speak of pond-lilies as wayside flowers, and yet, in a sense, they are so. Very refreshing it is to catch glimpses of their white, cool, odorous blossoms, anchored on some shaded pond, their leaves just tipping to the breeze to show their crimson lining. Among them grows yellow spatterdock, handsome in its place but coarse and mal-odorous.

It must be realized that our wayside flora will of necessity vary with locality. Along the sea beaches one will observe sea-lavender, jointed knotweed, rose hibiscus, yellow loosestrife, camphor-weed, maritine goldenrod and sea-side aster. Again, among the mountains will occur wild flowers not seen in the lowlands, mountain chickweed, dwarf azalea, Peck's geum and the like. Geology and geography both take a part in distribution as well as more subtle and accidental agencies.

Brown University, Providence, R. I.

THE PINE BARRENS OF NEW JERSEY.

THOSE who have gained their knowledge of the New Jersey "pine barrens" from a few weeks sojourn at Barnegat, Tom's River or other towns along the coast, supplemented by sundry glimpses from the car window as the train rushes along, may yet have but a faint idea of what the real pine barrens are like. To see them at their best—which in this case is also their worst—one must get further away from civilization than the railway will carry him. But before one leaves it, indications of what is to come are not wanting. The railroad dwindles from four tracks to two and finally one; the stations become smaller and draw further apart; and the vegetation steadily grows more dejected in appearance. At

the last change of cars—nobody can get into the heart of the "pines" without several such changes—one finds a train of two or three cars drawn by a wheezy engine which after some miles of jolting over uneven track finally comes to a standstill as if too tired and discouraged to go further. This is the end of the road and the few houses which constitute the last village are clustered about in a spot whose fertility, although slightly above that of the surrounding country, is still sufficient to make it a veritable oasis in this all but desert land. In all directions from its borders the gray sand extends, tenanted by stunted specimens of pitch pine whose stems are little more than poles, with a brush of yellow-green foliage at top which scarcely shades the small oaks and huckleberry bushes forming the principal underwood.

Upon entering the pines, one is impressed, not only by the paucity of species but also by the small number of individuals. The vegetation in may places is so scattering, that if the smooth level sand were solid, the bicycler might ride through the woods, choosing his own path, and meet with very few obstructions. With a wagon, one may drive about where he pleases. It is nevertheless the fashion to keep to the beaten path, even when a new one might promise better traveling. Once a road is broken, it is never wholly reclaimed by Nature, although travel on it may subsequently cease. One frequently comes upon such derelicts aimlessly sprawling across the country but apparently leading nowhere. It seems scarcely possible that the passing of an occasional wagon could keep the way open, but it is difficult for the plants to get a foothold in the dry soil, and the wind helps somewhat by blowing the sand about, so that the roadbed soon sinks below the surface, sometimes to the depth of a foot. In the yielding sand at the bottom the tires of the wagons are lost to sight. Three miles an hour is considered rapid traveling over such roads.

As much rain falls upon this part of New Jersey as upon any other, but the thirsty sand rapidly sucks up the moisture

and in a few short hours after a storm, the earth is dry again. These arid conditions have a very noticeable effect upon the few other species that here and there struggle with the pines and oaks for existence. For the most part they are heaths or heath-like plants with thick leathery leaves that are slow to let their scanty supply of moisture go. The wintergreen and trailing arbutus are common as is their near relative the bearberry. This latter is a prostrate shrub with small shining leaves and a profusion of red berries, very attractive to the sight, but containing a juiceless mealy pulp within. Apparently these berries once had juice, but the plant long ago gave up the idea of acquiring enough water in such a place to provide them with it. The cactus is the only green thing in the region that seems absolutely happy even in the driest weather. Its thick stems act as so many reservoirs storing up water during wet weather against a time of need and parting with it very grudgingly in dry times. This is probably the only plant that can produce juicy fruit no matter how dry the season. In June and July the plants are fairly full of the dark red "prickly pears."

It is sometimes difficult to understand how certain species of sand plants are able to exist at all until the underground portions are examined. It is then seen that the top is but an insignificant part of the whole plant, the thick roots often descending straight down for a distance of nearly six feet in their search for water. A notable exception to this is a species of "reindeer moss," a gray wiry lichen which forms little rounded knolls like pincushions on the bare sand. It lies loosely on the earth and appears not to be attached to it at all. At mid-day it is seemingly dead and the stiff branches crunch under foot, but as soon as the dew begins to fall it revives and at once becomes moist, pliant, soft as velvet and full of life.

Desolate and barren as the pines ordinarily appear the extreme is not reached until one has seen the tract of land

known as "the plains" lying due west from Tuckerton. They are seldom visited save by the berry picker or an occasional traveller taking a short cut to some distant village. If one can imagine a slightly undulating piece of ground, stretching away in all directions to the horizon and covered everywhere with diminutive pines and oaks, which, although not more than knee-high, bear their cones and acorns as plentifully as their more favored kin in better soil, he will have a fair idea of the region. The natives express its sterility by asserting that the only land tortoise ever captured in the locality was inquiring the way to the poor-house. In all this expanse, the tallest tree—a sassafras—is but fifteen feet high. To the botanist this section is of considerable interest since it contains several plants that are rarely found elsewhere. Among these may be mentioned the crow-berry, a low heathy plant which very few botanists have seen growing.

Among the most attractive spots in the barrens are the low places where the water comes to the surface. Here the sand vegetation suddenly gives way to cranberry bogs set thick with sundews, bladderworts and pitcher-plants all busily engaged in trapping insects. Or a greater depression may contain a cedar swamp whose tangled depths are the source of one of the amber-colored streams which leisurely wander away to join one of the numerous small rivers of south Jersey. As one emerges from the plains in the direction of Wading river, these bogs become very numerous, notwithstanding which, it is claimed that there is no malaria there and the natives drink from any running water with impunity.

The mosquito is everywhere in evidence, but by day these are not the greatest of the stinging, biting pests that inhabit the barrens. The crow-flies, black as night and as large as grass-hoppers, and several kinds of horse-flies which apparently consider man much better than a horse, are abundant and dwarf the mosquito's puny efforts into nothingness by com-

parison. When these bite, blood flows from the wound. Horses are rendered fairly frantic by their attacks. At sundown these insects retire from the field, leaving the mosquitos much reinforced, in full possession.

The cranberry bogs are usually thickly fringed with huckleberry bushes. Upon these two crops nearly all who inhabit the barrens depend for an existence. During the few weeks that the berries are ripe everybody is employed and even at the small price obtained for the berries it is not uncommon for a good picker to make ten dollars in a day. While some of the berries are picked by hand and some by means of an instrument not unlike a coarse comb, the greater part are "scooped." The "scoop" is a basket-like affair with the top covered over as far as the handle on one side. The open side is swung against the tops of the bushes by the operator with such skill that few except ripe berries fall into the scoop. The berries are then winnowed by being slowly poured from one basket held a few feet above another while the wind blows through them, carrying away any leaves which have fallen with the berries. Host of the huckleberry pickers live in or near the barrens and daily journey to the best grounds in all sorts of picturesque conveyances. The outsider who visits the region for the huckleberry season may usually be found camping out in the most primitive style near some town along the railroad where he may readily turn his berries over to the agent of the commission man.

Later in the year, the cranberries afford employment, but since they are for the most part cultivated and only a small price is paid for picking, the pickers earn much less. There are, however, many places where the cranberries grow wild and may be had for the picking. The huckleberries are considered free everywhere.

The bogs again afford many plants to interest the botanist. The bog asphodel, an orchid-like plant with a spike of

lemon-yellow flowers is found nowhere else in the whole world and is valued accordingly by the plant collector. It is only occasionally found and seldom in great abundance. The curly grass is another plant worth more than passing notice from the fact that it is the smallest fern in eastern America. A fair sized plant roots and all, may be covered by laying a single finger upon it. Its leaves are like very slender blades of grass, coiled corkscrew-fashion and one must get down on hands and knees to find it. New Jersey is the only state in which it grows. These bogs are regarded as paradises by the botanist and in their season furnish a wealth of orchids and other rare plants not to mention commoner things which attract the plant lover.

If one consults a map of this region, he will find many places marked upon it which fail to materialize when search is made for them. It usually turns out that they are the sites of iron furnaces which were once employed in extracting iron from the bog ores. With the diminution of the ore supply the furnaces were gradually abandoned until all that now remains of many are crumbling walls and decaying timbers about the hollows where dwellings once stood. A few small hamlets have managed to exist after the fires in their furnaces died out, but the greater number are deep in decay, tenanted only by the lizard who delights to bask in the sunlight upon their fallen walls.—*New York Tribune.*

THE GREAT PRIMEVAL FOREST

THE great primeval forest, which is perhaps represented on a more impressive scale than anywhere else in South America, is the same that was described by the brothers Schomburgh in 1848 and 1850. We traveled up the middle course of the Essequibo river for seventy miles without finding a solitary clearing; not a single break in all the forest except where tributary streams flowed into our own. On both banks

of this chocolate-brown stream at a distance of seventy miles from its mouth, where the width of the stream is still from one to two miles or four or five times the normal width of the Mississippi river the great curtain of the primeval forest hangs virtually untouched by man. If I were asked to state briefly the distinguishing characteristics of this forest, I should find it difficult to frame a reply or to give to it proper perspective in comparison with the forest elsewhere. The great South American primeval forest is impressive; is imposing, but at the same time it is forbidding. With the great walls of vegetation rising to a height of 175 and 200 feet, with the crown of the forest carried at this enormous height above the spectators, and with innumerable creepers and trailers binding the whole into an almost impenetrable maze, the eye that is on the exterior has difficulty in finding points of rest or repose. But little sunlight penetrates into the recesses of the interior, and what there is of it comes out in scattered flecks of brilliantly reflected light and not as sunlight areas.

In its botanical relations the forest does not look particularly tropical, if by tropical we mean an aspect of vegetation which is dominated by types that one habitually associates with the lower climes and whose general physiognomy differs from the types of temperate regions. It is true that the eye fails to note the familiar forms of the oak, the maple, beech birch or poplar, but the general contour of tropical foliage, especially where it appears lost in mass, is not very different from that of these trees or of trees that in one form or another make up the bulk of the north woods. Except where clumps of palms stand out in particular relief, the trees of the South American forest have, apart from exceeding luxuriance and magnitude of dimensions, so nearly the characteristics of the foliage of the trees of our own region that the traveler could easily misinterpret the landscape of which they formed a part. Even where palms are present, they generally lose their crowns in the wall of vegetation that rises

above them and no longer appear as dominating or physiognomic types in the landscape; they are hardly more than sporadic components of the vegetation.

It is only when we penetrate into the interior of this great forest, when we study the individual elements that compose it, that we begin to be impressed with distinctive characteristics. One can truly say that almost every tree of the South American primeval forest is a botanical garden of its own. Rising up in supreme magnificence, the trunk hardly sending out a branch before it has attained a height of 125 or 150 feet, and completely overgrown with creeping and climbing plants, aroids and orchids, it is wholly different from the trees of the northern woods as it well can be. The tendency to spreading umbrella-like crowns differentiates the forest components of the south, as do also the giant buttressed roots which distinguish so many of the species.

Alfred Russell Wallace, who has enjoyed unusual advantages for the study of the general characteristics of tropical vegetation, has emphasized as one of the marked features of the tropical forest the absence of flowers. He says, indeed, that one may travel for weeks at a time along the streams of the Amazon region without once realizing those aspects of floral development which, whether by profusion of growth, or by size and color, impress the landscape of temperate regions. This picture does not seem to apply to the forest of the river-banks of the Guianas, and its inaccuracy has been pointed out by that acute student of nature, Mr. Inturn. The streamers of purple, red and white which hang down over the forest curtain easily recall in profusion and wealth of color the flowers of the north—the field daisy, clover, and buttercup. Indeed, it would be difficult to recall in forests of the north, even as rare instances, that display of flowers which so frequently repeats itself here.—*From an article by Prof. Angelo Hielprin in National Geographic Magazine.*

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

VERJUICE.—The civilized palate craves not only food, but various condiments which of themselves have little if any food value. Mixed with the food they give it a certain relish. Some of the well known condiments are pepper and other spices, vanilla, vinegar and red pepper. A condiment much prized in earlier times was called verjuice. This was made by expressing the juice from green apples, crab-apples, unripe grapes and other unripe fruit. Verjuice was intensely sour and used like vinegar or lemon juice is at present. It is said to still be used to a limited extent.

VIOLET HYBRIDS.—Dr. Ezra Brainerd has been growing some of the reputed species of blue violets from seed and the results have shown what all of us have felt morally sure of, namely, that many of the recently named species of blue violets are simply hybrids. Dr. Brainerd says that the seedlings of the pure violet species resemble one another very closely, but the hybrid offspring are not only unlike each other but often unlike their parents. In cases like the latter we would be inclined to inquire whether the reputed pure parent species were not themselves hybrids. At present, the genus *Viola* in the Eastern States is regarded by radical botanists as being composed of a considerable number of closely allied species that freely interbreed, but we ask, why are these radical bot-

enists so cock-sure that these are species, why not sub-species or forms? If we consider them forms they will serve just as well as an attachment for the name of a botanist and that is all any such fine distinctions are good for. When species of violets are split so fine that a violetologist cannot name his own species without looking at the labels it is nearly time to stop.

Knowing Beans.—The man who "doesn't know beans" is considered of not much account, but there is a great deal about this common vegetable that is not familiar to the average individual. We usually speak of beans as if there were but one edible species; in reality there are more than half a dozen commonly cultivated. The kidney bean (*Phaseolus vulgaris*) is the one with which we are most familiar, the common bush bean being of this type. The lima bean (*Phaseolus lunatus*) is also well known, especially in Southern gardens. The scarlet runner bean (*Phaseolus multiflorus*) is seldom used as a garden crop with us, but its bright red flowers and gaily colored pods make it sought to some extent for decorative planting. In Great Britain it is commonly cultivated and is there called runner bean. The root is perennial and may be kept over winter in the cellar. Another British favorite is the broad bean (*Vicia faba*) often called the horse bean and without doubt the species fed to his horse by the immortal Captain Jinks. The seed is not very bean-like and the plant itself looks more like a pea than a bean. It, too, is perennial and loves a cool summer. For this reason, many more are grown in Canada than in the United Staes. The soy or soja bean (*Glycine hispida*) is the bean of the Japanese. It is becoming common in cultivation in our own country, but as yet only as a food for cattle and hogs. The hyacinth bean (*Dolichos lablab*) is another bean used for decorative purposes that is edible. It produces very long pods and is in consequence called asparagus or yard-long beans. The velvet

or banana bean (*Mucuna utilis*) completes the list of our common beans. This latter is a native of the tropics and is likely to be redistricted to the warmer parts of America. It is used for a forage crop and for plowing under to enrich the soil.

Horehound for the Million.—One of the weeds that amount almost to a pest in Southern California is the common horehound (*Marrubium vulgare*) of the old fashioned herb garden. It is abundant wherever the ground is cultivated, and its matured seed-vessels cling by prickles to the wool of animals and to the clothing of pedestrians in the persistent fashion of the begar's ticks and Spanish needles of the East. The average Eastern tourist with interest enough in plants to notice it at all, usually mistakes it for catnip, but curiously enough the latter herb seems never to have become wild here. At least, I have never seen it, nor do the local manuals list it.—*C. F. Saunders, Pasadena, California.*

Butter-cups and Daisies.—It would be hard for residents in some sections of the Eastern States to imagine a region in which the common butter-cup and daisies are rare or unknown but such a condition prevails in the editor's vicinity; indeed, at the present time, a thriving bunch of the plant which in other regions is the despised white weed or oxeye daisy, is blooming among the other flowers in his garden. Now and then, one may find a tuft of this plant along the railroad like a tramp looking for fresh fields, but the flowers are as yet an absolute novelty to most people who have never made a visit to the east. As to butter-cups, while there are plenty of indigenous species *Ranunculus acris* so common in the east is decidedly a rare plant. In this connection it may be of interest to note that the black-eyed-Susan (*Rudbeckia hirta*) rarely if ever fills up single fields to the exclusion of everything else as it does in the east. Here it occurs scattered among other species that hold it within bounds.

NATURE'S EXACTNESS.—Your observations on Nature's exactness in the *Note and Comment* department of your May issue, reminds me of a little aster-like flower which I have collected on the desert, *Monoptilon bellidiforme*. Each flower-head is composed of perhaps 15 or 20 florets, each of which produces a single seed, and every spring tens of thousands of these little plants come into being, making myriads of seeds thus produced. The marvelous thing about them, however, is that on the upper edge of each of those myriad seed is borne one tiny bristle which drops with the seed. It is a case of degenerate pappus, and the wonder is that nature, busy as she is the world over, never forgets that solitary bristle for each of those little florets away out there among the coyotes and prairie dogs of the Mojave Desert.—*C. F. Saunders, Pasadena, Cal.*

NOMENCLATURE AGAIN.—It is not botanists, alone, that are bothered with the name-tinkers. In a recent number of *Science*, J. L. Kingsley writes that he has been looking for fixity in zoological names for thirty years and the end seems as far away as ever. We quote from his article as follows: "It is all very well to indulge in these antiquarian researches, these games of taxonomic logomachy, if they be recognized as such, but the players fail to recognize one thing: Names of animals and plants are but means for easy reference; nomenclature is not the end and object of all biological science. This digging up of forgotten screeds means but the relegating of the great masters of the past to a secondary position; this framing of ex post facto laws offers a precedent for the future subject of that intolerable disease once known as "mihi itch" to set aside as lightly the laborious schemes of the sciolists of today. Biologists may apparently be divided into two groups: one contains those who find great enjoyment in renaming things already well named and who regard names as the object of all science. The other group have something to

tell about animals and plants and they regard names merely as a means of identification of the forms referred to. The question once was, "who reads an American book?" If the present tendency continues it will soon be "who can read an American biological work?"

Pennsylvania Wild Flowers.—About the middle of May a party of five crossed the Susquehanna River at Millersburg, Penn., intent on finding as many specimens as possible on which there were open flowers. Our territory covered that part of Perry County between the landing and Mt. Patrick. Directly after landing we discovered our old friend, common blue violet, (*V. cucullata*), and growing near were the white violet, (*V. blanda*), and yellow violet, (*V. pubescens*). Scattered among these was pale corydalis, (*Corydalis glauca*) and not far away cinquefoil, (*Potentilla Canadensis*) celandine, (*Chelidonium majus*) and wild cranesbill. (*Geranium maculatum*). Soon one of our number spied what seemed at a distance to be a white star-like flower but on coming nearer we found it to be dog's tooth violet (*Erythronium Dens-canis*) living within calling distance of its near relative yellow adder's tongue (*E. Americanum*). As none of us had ever before found the former, it was with difficulty that we left the patch in which grew millions of a plant that we had considered quite rare. Separated from this colony by a shallow stream, we discovered smooth lungwort, (*Mertensia Virginica*), wild blue phlox, (*Phlox divaricata*) and Dutchman's breeches (*Dicentra cucullaria*) growing in such profusion that we could but wish that the contributor to the American Botanist, who lived where Dutchman's breeches would soon be a rare flower, might have enjoyed with us the splendid flowers and luxuriant foliage. Mingled with these we saw sweet cicely, (*Osmorrhiza longistylis*), crow's-foot, (*Dentaria laciniata*) and bitter-cress, (*Cardamine rhomboidea*). On the margin of a near-by field, long-leaved stitch wort, (*Stellaria

longifolia), rock-cress, (*Arabis lyrata*), hedge mustard, (*Sisymbrium officinale*) and pepper-grass, (*Lepedium Virginicum*) had found an abiding place. We had now almost reached Mt. Patrick, a settlement which from a distance bears a strong resemblance to a Swiss village, and turning homeward by a different path we found spring beauties, (*Claytonia Virginica*) and ground ivy (*Nepeta Glechoma*) while in a neighboring woods were butter-weed (*Senecio vulgaris*) and Jack-in the-pulpit (*Arisaema triphyllum*). A lonely columbine (*Aquilegia Canadensis*) and a bare half-dozen wood anemones (*Anemone nemorosa*), near which in a very sandy soil grew a few horse-tails ended our list and we, having completed our circle, boarded the steamer, feeling that the trip was worth all the fatigue it had caused us.—*Katharine P. Smith, Millersburg, Penn.*

Edible Flowers.—The cauliflower and artichoke are by no means the only kinds of flowers that are used as food, though, from an edible point of view, Dr. Johnson was probably right when he said the former was "the finest flower of the garden." Cloves and capers are well known to professors of the culinary art and both consist of flowers, the former being the dried flowers of a pretty myrtaceous plant from the far east while capers come from the shores of the Mediterranean and other temperate climes and are made from the partly opened blossoms of a trailing bramble-like shrub. These are all well known edibles but there are many flowers used for eating in other countries that we only admire for their delicate beauty. The Chinaman, for instance, has a penchant for pork served with a sauce made from various members of the lily family, the flowers being first dried and powdered, while the ginger family, besides the root produces flowers that are much relished by native tribes in the Himalayas. In various parts of India and also in New Zealand the pollen of certain flowers is made into bread, while the little brown man from

Japan likes his chrysanthemum salad, made from the petals of his national flower. In England the taste seems to run to drinks, and just now the children are busy gathering cowslips to make cowslip wine. —*Gardening.*

FASCIATED DANDELIONS.—From Miss Mabel Dimock, Peekamose, N. Y., we have recently received excellent specimens of faciated dandelions. In these specimens there has apparently been a slip in the machinery of nature with the result of uniting what would ordinarily be two or more flower-heads into one. In some years these freaks are quite common and may be distinguished from the normal flower-heads at some distance by their unusual size. Fasciation has been reported in many other flowers, and De Vries, by cultivation has been able to produce a race of fasciated plants from several including the dandelion. It is interesting to note that the coxcomb (*Celosia cristata*) often found in old fashioned gardens is a fasciated plant that has almost replaced the normal form.

THE FARMER'S MENTAL EQUIPMENT.—It is believed by some dwellers in the city that the farmer lives on a farm because he hasn't brains enough to do anything else. The *Ashland Gazette* sizes the case up differently and says that a successful farmer must know considerable of several sciences. "He must have botany enough to enable him to understand the nature of his crops and how they grow; geology enough to know the different kinds of soil and their properties; entomology enough to know which insects are pests and which are friends; ornithology enough to know which of the birds are injurious and which are helpful; forestry enough to know how to properly reserve, extend and harvest his woodland; and horticulture enough to know how to manage his fruit and vegetable gardens." Ordinarily the farmer does not go in much for botany as such; in fact, he may imagine he has no

botany because he may not have taken this study up in school, yet the successful farmer is one of the best of practical botanists. He may not always understand the fundamentals of every operation requiring botanical knowledge but he knows what to do to produce effects. Long before the scientists ascertained why leguminous plants enriched the land, the farmer was familiar with the fact that clover plowed under added fertility to the soil.

RANGE OF LYCHNIS ALBA.—The white evening campion (*Lychnis alba*) is a weed so recently introduced that it failed to be noted in any but the most recent Manuals and the range is given as Ontario and the Middle and Eastern States. It is very evident that it has come to stay, however, for it is steadily increasing its territory. It has been known for some years from Joliet and no doubt may be found in the environs of Chicago. An account of this plant was published in volume I, of this magazine.

POLYEMBRYONY.—When we plant a seed we expect it to produce a single new plant, but instances are not rare, in which the seed contains more than one embryo and then we may get several plants from a single seed. Polyembryony as this condition is called is found in at least a dozen plant families and in thirty or more different species. As is well known, the single embryo found in ordinary seeds is produced by the fertilization of a single cell, the egg-cell, within the embryo-sac of the ovule. The extra embryos found in polyembryony arise in different ways, sometimes from other cells within the embryo sac, at others from cells just outside of it. In the June *Torreya* M. T. Cook records his experience with the seeds of the mango tree (*Mangifer Indica*) in which he found at times no less than eight embryos. The orange (*Citrus aurantium*) was the first plant in which polyembryony was found and it still remains one of the most frequent exhibitors

of this feature. Now that plant breeding is progressing on scientific lines, this polyembryony is likely to cause much bother to the horticulturist because usually only one of these embryos comes from the fertilized egg which results from careful pollination and when several seedlings spring from one seed, he is quite at a loss to know which is the hybrid and which are mere offspring from the plant pollinated.

Honey Guides of Burning Bush.—The burning bush (*Euonymus atropurpureus*) is an attractive object in the autumn woods when its pinkish seed-pods begin to open exposing the red-arilled seeds inside, but the flowers that produce these seed-pods are quite as interesting. They are rather small and dull dark red in color, suggesting at once the specific name of the plant. There are four petals, and the ovary is surrounded by a thick disk, such as may be seen in many maples and other near relatives. The chief interest centers in the stamens with bright yellow anthers which alternate with the corolla and are very noticeable against the back ground of dull red. Soon after the flower expands the anthers fall off leaving the short thick filaments, like little posts, in the flower. Since the filaments are also red, one can tell by a glance at the flower whether it is a fresh one or not and the contrasts in color may serve as an indication to visiting insects.

Peach and Plum Leather.—Man has discovered a variety of ways for preserving fruits after their season is over. Some like the apple may be kept fresh by simply storing in cellars, others like the fig and prune are dried, still others like the olive are preserved in brine or, like the cucumber, in vinegar, while others are canned as are pears, cherries and the majority of our fruits. A variation of the drying process applied to peaches and plums consists in drying the crushed pulp of these fruits on a platter in an oven forming a fruit "leather." A few hours soaking makes the leather ready

for use. The Italians and other foreigners ofter preserve tomatoes, of which they are very fond, in the same way. This process is not far removed from that by which guava and cactus "dulce" is made in the tropics. In this connection the Turkish method of preserving grape juice may be mentioned. The juice is boiled down until it is about as thick as molasses and is then further thickened with starch or flour, and spread out in thin sheets to dry in the sun.

TREES INJURED.—Our chilly and prolonged spring has not seemed to affect our native trees, except the sycamores (*Platanus occidentalis*). All of these that I have seen in this section had their new leaves nipped, apparently by frost, just after they had begun to put them out—when the largest were about two or three inches broad and all that I have seen hereabouts are covered with the dead leaves. They have started a new set of leaves, but the young leaves are now only about as large as the first set was when nipped, presenting a marked contrast to the maples and other trees now in full leaf.—*Elwyn Waller, Morristown, N. J.* [It is just possible that the trees have been attacked by a fungus. In the vicinity of New York, many of the oriental plane trees (*Platanus orientalis*) are killed back each spring by this fungus.—*Ed.*]

THE EARTH STARS.—According to Mr. C. G. Lloyd, who has pretty thoroughly searched this planet for specimens, there are but forty-six marked forms of the curious little earth-stars (*Geaster*) in existence though, as is usual in such matters, one hundred and twenty-seven names have been proposed for them. Mr. Lloyd thinks that seventeen of the forty-six forms are not worthy of specific rank, and what he thinks on this subject is nearly certain to be right for no man has seen more of these plants than he. If those who make "new species" of plants were required to see their plants growing before giving them a name, there would be fewer names to both-

er real students. It may almost be set down as an axiom that the maker of the most "new species" knows least about the plants in the field. One may even become so unacquainted with living plants as to be unable to recognize them. "Let us dry it and then see how it looks" said New England's most distinguished botanist when asked for the name of a plant that was not familiar to him.

SASSAFRAS.—I do not think I have seen it recorded that one seldom finds a sassafras tree 8 or 9 inches in diameter, of which the top has not been broken out by some high wind. The break is, of course, an inducement to rot and the broken top often shows rotten wood, but the original cause of the break appears to be due to inherent brittleness in the wood and not to weakening through rotting.—*Elwyn Waller, Morristown, N. J.*

GROWTH OF PERENNIALS.—Even from its seedling stage, the ordinary perennial is a plant of very deliberate ways. The annuals are the active individuals. They must be up and doing or cold, drouth, insects, other species or the gardener may forever prevent their accomplishing their life work. But the perennials, able to withstand the cold of winter, are in no hurry, apparently counting a firm root-hold in the soil and a small amount of stored food accomplishments enough for one growing season. One can almost tell whether a seedling is an annual or perennial by the rapidity with which it grows. The purslane (*Portulaca oleracea*) is one of the latest of weeds to appear each season, but no one ever saw the "pusley" crop short for lack of growth.

EDITORIAL

According to our custom, no numbers of this magazine will be issued for July and August. The number for September will be issued early so that when our subscribers return from their vacations they will find the first number of the new volume awaiting them. We trust that all our readers will have a pleasant summer and return from their outings with full note-books. We dare not expect that their pocket books will be in the same condition.

* * *

The botanically inclined often have occasion to observe the truth of the old couplet that

> " 'Tis strange what difference there can be
> 'Twixt tweedledum and tweedledee."

This is well shown in the mere identification, of plants. Take a plant in hand to a botanist for name and he will identify it, give you its family history and tell you what it is good for and consider your thanks adequate pay for the trouble. But take a plant in your throat to the physician and he will identify it as diphtheria, and charge you well for telling what is good for it, or rather what is good for you by being bad for it. Nobody thinks the physician should work for nothing; he has studied hard in order to identify just such frisky bacteria and other plants that make our anatomy the scene of various colonizations, and his money is well earned when he has aided our bodies to exterminate the would-be colonizers. But the botanist belongs to a different class. Though he studies as long as the physician he usually works for nothing. The great Linnaeus, himself, dubbed botany "the amiable science" and its votaries ever since have been an amiable lot of men and women who have done more work without reward than any

other group of scientists of like attainments anywhere. And the botanists, themselves, are usually so animated by a love of the subject that they do not complain. The contributors to the botanical magazines write without pay, the editors devote their time and talents without thought of compensation and the publishers half expect to find themselves in a financial hole at the end of the year. As a matter of fact, we cannot recall a single botanical magazine now published except THE AMERICAN BOTANIST that is not backed up by some society pledged to make good any deficit and usually called upon each year to do so. Since this magazine is not backed up by a botanical society, we find it necessary to make it pay its own way. We have practically said to it what nature has said to the flowers, namely, if you cannot survive without aid, you must perish. Thus far the magazine has survived and we expect it to go right on surviving, but at this time, when, a large number of subscriptions are due, we would call attention to the fact that an increased subscription list will mean a better, or rather a larger magazine. We see all the botanical magazines published in America, and we know there are none better if judged solely by the amount of information supplied. Of course there are many larger, but the technical articles, which interest only the few, take up much of the space. It is not the easiest thing in the world to find subscribers interested in our particular kind of botany. It requires a pretty thorough knowledge of plants in order to appreciate a great deal of the matter we publish, and the majority of botanizers are, unfortunately for us, interested in little more than the names of plants. It is a satisfaction to know, however, that once a subscriber is secured we rarely lose him and sooner or later he orders a set of the back numbers. So we purpose continuing our endeavor to please our present audience and to urge our friends to help us increase it. We send out bills with this issue to all whose subscriptions expire or have expired and

hope that all will renew. The magazine is sent until ordered discontinued in order to please most of our subscribers. If you no longer wish the magazine kindly notify us. In order to induce new subscribers we offer to send two copies of this magazine to different addresses for $1.60. If you induce a friend to subscribe at $1.00 you save forty cents on your own subscription, or you may divide the saving with him. Most of our readers have acquaintances who are also interested in botany. It would be easy to induce them to subscribe and thus double the subscription list. If this is done, we will double the size of the magazine without extra cost. We promise that the coming volumes will be as good as any that have appeared, and on these grounds invite all our subscribers to renew.

BOOKS AND WRITERS.

Most of the works on American botany have been written in the United States but Canada now come to the front with "Studies of Plant-Life in Canada" by Catherine Parr Trail, well known as an author of other volumes on Canadian subjects. The plants to receive attention in the present volume are practically identical with those growing in the woods and fields of the Northern States. No attempt has been made to include even all the showy flowers and the fact that it is not designed as a manual of the region is shown by the lack of a key of any kind. The text is entirely concerned with interesting bits of information about the conspicuous plants of the Canadian woods in which are interspersed many quotations from the poets. The grouping follows, in a measure, the sequence of the seasons. Twenty plates, some of which are in color, embellish the work. The book is an octavo of some 200 pages, and will be very useful in winning a wider regard for the wild-flowers of the region covered. (Toronto; Wm. Briggs, $2.00 net.)

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DEVOTED TO ECONOMIC
AND ECOLOGICAL BOTANY

EDITED BY WILLARD N. CLUTE

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CONTENTS

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NOTE AND COMMENT.

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CONTENTS

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Issued on the 15th of each month except July and August

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SPECIAL NOTICE.—This magazine is issued in two half-yearly volumes of five numbers each. Subscriptions $1.00 a year. All subsriptions must begin with a volume. To avoid the loss of numbers to regular subscribers, the magazine is sent until we are notified to discontinue and all arrearage paid. No one receives the magazine free except by special arrangement.

SAMPLE COPIES.—One cannot always judge of a magazine by a single number. Those who receive extra copies are asked to give them a careful examination. We know when a plant lover becomes familiar with the contents of this magazine he invariably becomes a subscriber. A single number may often be worth more than is charged for a year's subscription. The full set is almost a necessity to the plant student.

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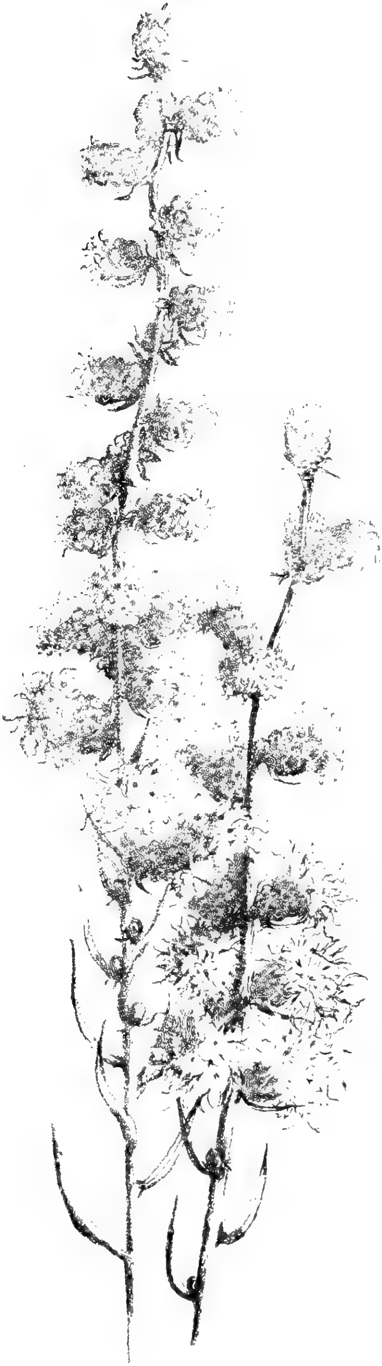

THE BLAZING STAR.—*Liatris Scariosa.*

THE AMERICAN BOTANIST

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THE BLAZING STAR.

BY WILLARD N. CLUTE.

THE flora of the prairies has long been reputed to be one of the most beautiful in existence. Throughout the spring and summer months there is a succession of handsome flowers that submerge the grasses beneath waves of color and rival the best of other regions, but it is not until autumn draws near and one after another of these blossoms give way before the advancing army of composites, that the prairies really prove their claim to the possession of the finest flora in the land. The golden-rods and asters of other regions are here, the bonesets, the rudbeckias, the iron-weeds, and others common to the low grounds farther East flourish, but to their numbers are added in this region many that are frequently known only by name to the inhabitants of New England and the Middle States such as *Lepachys, Echinacea, Coreopsis, Actinomeris,* numerous species of *Helianthus* and last, but by no means least, the blazing stars.

The pioneers who called these plants blazing stars were extremely felicitous in their choice of terms. When one comes unexpectedly upon a clump of these plants with their purple blooms borne high on slender stems above the grass-like leaves they seem a very constellation, indeed. Quite in keeping, too, with this picturesque appellation is the name of gay feather by which other species are known. Man, however, is too utilitarian to simply admire; he must endeavor to find uses for even beauty itself, and so we have certain species called button snake-root and rattlesnake-master from their reputed

power to cure the bites of the rattlesnake. The generic name *Liatris* meaning invulnerable, also alludes to this belief.

There are several members of this family common to the West. When not in bloom most of them so nearly resemble open grassy places and natural meadows of the South and the grasses among which they grow as to pass unseen. Even those whose radical or lower leaves are lanceolate show their relationship to the others by producing grass-like leaves on the stem. Underground also, they are much alike, the stems springing from a hard, dark tuber-like organ, which produces tufts of roots from its lower surface. Gray calls it a corm or tuber and there seems to be no doubt that it is a form of stem though frequently called a root. In the largest specimens it may reach the size of one's fist, but the plants begin to bloom when their tubers have become half an inch in diameter and thereafter yearly increase both the size of the tuber and the number of flowering stems until the latter sometimes number more than twenty.

The most showy of the common species are probably *Liatris spicata* and *L. pycnostachya.* They often produce trusses of flowers two feet or more long. *L. spicata* has the larger flowers and is further distinguished by having obtuse scales while in *L. pycnostachya* they are acute and squarrose. *Liatris scariosa,* shown in our illustration, has roundish flower-heads the bracts of which are tinged with purple. While still in bud it is quite as fine as many other flowers when in bloom. *L. squarrosa* has a general resemblance to this species, but it is not as tall and the involucral scales are pointed and spreading. It also extends farther east than any of the others, reaching the Atlantic coast in some places. These two species are the ones usually called blazing stars and *L. scariosa* is also called gay feather and button snake-root. It is one of the tallest of the genus, often reaching six feet in height. A fifth species *L. cylindracea* is not so conspicuous as the others. Its flower-

heads, though large, are few in number, but make up for lack in numbers by remaining in good condition for a long time.

The flowers of all the species are remarkably alike in color, but a color not easy to describe. Purple is a general term for all flowers of a similar color but these would be scarcely called purple. They remind one both in shape and color of the flowers of the ironweed (*vernonia*) thought they are never to be confused with that plant even at a distance. The plants seem to prefer dry, gravelly soils but will thrive anywhere and are extensively planted in parks and other decorative plantings.

A NEW BOTANICAL GARDEN.

BY MRS. CORA E. PEASE.

A WILD Botanic Garden having many distinctive features has been established within the past year by the teachers of botany in the city of Minneapolis. From year to year these teachers found it more difficult to procure plants for study in their classes, often having to take the train to distant localities at wasteful expenditure of time, money and energy for rare things, as pitcher plants, orchids, sundews, ferns, etc., that once grew within the city limits. A section of unimproved park land containing a tamarack swamp, a bit of meadow and of woodland appealed to them as very desirable to preserve in its natural condition for the beginning of a wild botanic garden. They had no difficulty in interesting the State University, the Park Board and public spirited citizens in their scheme, so that the desired land was set aside for the garden; to be protected and all necessary labor to be done by the Park Boad, while the teachers have the control of its management, including, of course, the plan of planting.

A minute topographical survey of the land has been made, so that what is already growing, and what is to be planted can be mapped out on every foot of the ground. It is intended to

avoid all artificiality of treatment. Sometimes when a particular species grows in great abundance, a portion may be removed to make space for something more desirable, but there is to be no trimming into special shapes. Plants are to be allowed to grow as they will, not as people may will them to grow. As far as possible the garden is to be representative of the flora of Minnesota, the introduced plants to be set out, as nearly as the conditions will allow, as they are found growing in their natural environments. Thus the garden is designed not only to teach systematic botany, but also ecology and forestry, and to demonstrate that our native plants are as beautiful and decorative as those introduced from abroad.

The garden has been enclosed by a fence, and vines planted to trail over it in this order: woodbine, clematis, honeysuckle, wild grape, bittersweet and smilax interspersed with moonseed, (*menispermum*) yam, apios and hop. Most of these vines already grew in the garden and were simply transferred to the necessary localities. Fallen and decayed limbs have been removed, and stepping stones placed in the bog.

Before long it is hoped to annex an adjacent section of land containing a brook which will be planted with the forget-me-not, cardinal flower, orchids and other brook-loving things. A watery depression in the bog is to be enlarged to a small pond for other aquatic plants. The teachers are formulating still other ideas for enhancing the beauty and scientific interest of the garden. Each year graduating students will place with appropriate ceremony some new plant in the garden as a class memorial.

Sixteen species of trees are naturally growing in the enclosure, the most abundant being tamarack, the white and the yellow birch, black ash and hop hornbeam. There are about twenty-five species of shrubs, including cornels, cherries, sumacs, viburnums, willows, shad-bush and red-berried elder. Among the most interesting herbs already established are

pitcher plant, sundews, linnaea, cypripediums, gentians, miterworts, gold-thread, trilliums, wild buck-bean, marsh marigold, dwarf cornel, clintonia, wild calla, grass of Parnassus, violets and meadow rues. The most abundant ferns are the clayton, cinanmon, sensitive, maiden hair, bladder fern (*fragilis*), lady fern and botrychium (*Virginianum*). The swamp is rich in mosses and lichens.

The teachers of botany in Minneapolis have certainly undertaken a most fascinating and important work if only they succeed in saving in a natural condition the wild things already established within the garden. One can hardly comprehend the result of extending its flora until it includes that of the whole State. Not only the young people passing through the schools, becoming participants in the work, will be incalculably benefitted, but it will be of great pleasure and profit to mature citizens also; for a bit of natural growth is a source of greater delight to the true nature lover than the most beautiful and most highly cultivated formal garden could ever be.

Malden, Mass.

FALL FRUITING OF THE CINNAMON FERN.

ALTHOUGH the cinnamon fern (*Osmunda cinnamomea*) is one of our most abundant species, it is quite apparent that we do not know all about it. It has an interesting trait of fruiting in the autumn in the southern States, and as yet no explanation of this peculiar habit has been given. That it normally fruits in spring there can be little doubt. In southern Louisiana I have thus found it in March, and Mr. W. C. Dukes writes me that in the vicinity of Mobile, Ala., he finds it in full fruit by the last of February, and occasionally some fronds by the middle of that month. In the same line the observations of Mr. W. C. Steele for Florida indicate that the plants fruits there in spring. It is among the earliest of our

ferns to fruit, and in its farthest southern haunts begins to grow shortly after the new year begins. In February, 1900, I collected it in fruit near Guava Ridge in the Island of Jamaica at an altitude of about 3,500 feet. The difference in altitude between this station, which, by the way, is the only one in Jamaica, and the Florida station would equalize the difference in latitude between the two. Thus the fruiting impulse may be said to begin in the West Indies and the Gulf Coast in February, passing over the southern States during March, reaching the northern States late in April and going on into Canada in May.

The second fruiting season appears rarely, if ever, to reach very far north. Mr. Steele has noted it in Florida, and in a recent publication Mr. A. A. Eaton says (doubtless incorrectly) that "Its common time of fruiting appears to be early November, as it was in full fruit in the middle of the State at that date, and bore no indication of fruit in March, save in the case of one plant." Mr. W. C. Dukes found them fruiting about Mobile, Ala., at least three weeks earlier. He, too, found the fruiting general, and says, "I have run across colonies where scarcely any failed to develop a fertile frond. In one place I counted over fifty plants fruiting, but noticed that the fronds were not so robust as those found in spring and not as tall.

As to the cause of the fall fruiting the suggestion made by Mr. Dukes seems to offer the best explanation. He observes that the fall fruiting seems to be most prevalent in those years when summer extends far into autumn. The rains that follow form a second spring-like season, beguiling the ferns to fruit. It would be interesting to know just how general the fall fruiting of this species is, and how far it extends northward. Do the ferns fruit every year in autumn? Do the same ferns fruit again in spring? Do all, or nearly all, the ferns fruit in

autumn? Are there more fruiting fronds produced in autumn than in spring? If our readers can give answers to any of these questions, we shall be glad to have them.—*Willard N. Clute in Fern Bulletin.*

THE SPURGES.

BY DR. W. W. BAILEY.

AMONG the plants annually sent the writer for determination, none is more frequent than the cypress-spurge. It seems the infallible ill-luck of beginners to meet with the oddities and freaks of nature, and even the trained botanist meets with few greater eccentricities than those of the genus *Euphorbia*. With the confidence which comes of a few lessons under a competent master, the young student, though constantly warned that he may meet with pitfalls and barbed wire in his course, proceeds with confidence to tackle what the old hand puts aside for a very rainy day.

Dr. Asa Gray used to remark of *Euphorbia* that properly constructed ones were put in South Africa or other remote lands, in order that the man of science should have his knowledge properly tested. The botanist was first, on data presented by the species he familiarly knew, to build up a theory, which later would be confirmed by discovery.

The trouble with Spurges—and the Spurge family in general—is that nature has played with them many varied tricks of omission, and again, has exalted things usually trivial into bodies or organs superficially resembling parts of common occurence in other plants. She seems to have put to herself the problem of how to form a flower unlike any other, and with as few parts as possible. Yet, when one looks at a spurge or any of its congeners, he never doubts that he has a perfect and complete flower.

So far as stems and leaves go, there is, as a rule, nothing peculiar. Most of the plants possess a milky, acrid juice, in

some species, like croton and castor oil, of great medicinal value. Hence we sometimes hear them called milk-weeds, but as a matter of fact, they are not related at all to the beautiful genus *Asclepias.*

Let us look at our common cypress spurge (*Euphorbia cyparrissas*), as a type. It is an introduced plant found in old country cemeteries or on waysides near older houses. It rarely wanders far away, but like the tawny day lily loves the old home and colonial story. It grows in bunches or clusters, generally less than a foot high, with numerous linear stem leaves. Those nearer the flowers are heart-shaped. The flowers are arranged in umbels. Let us look at one of these.

Mark Twain used to say of New England weather, that the observer and prophet was pretty confident till he came to our borders, "Then see his tail drop!" With our spurge the beginner is toplofty till he gets beyond the umbels, when, as modern slang has it, he "wonders where he is at." What appear to be flowers consist of cup-shaped involucre, looking like a calyx or corolla—and even so called by old authors. This cup bears thick, yellowish glands in its notches. Within the cup are two kinds of flowers—numerous male ones, consisting each of a single stamen, with anther sessile on the flower stalk—and jointed thereto. There are no floral envelopes at all. A single female flower, consisting only of a three-celled ovary, on a long pedicel, projects from among the staminate flowers, and like them, has neither calyx or corolla. To resume, what appears to be a collection of single flowers in an umbel, is a group of inflorescences each imitating a flower—and each consisting of many male and one female blossoms.

The joint in the flower-stalk shows where the calyx and corolla should be, and where in certain confirmatory exotics they really are.

Let the reader now understand that we have described but

one species of a single genus of a very large family. Its freaks, queer enough to start with, are played upon in a hundred different ways till they become the dread even of the professional. Take examples from the one multiform genus *Euphorbia*. How could we ever imagine that the splendid *Poinsettia* with its long scarlet bracts, or the snake-like *Euphorbia* of hothouses, or the very pretty "snow on the mountains" of our Western States, or the little weedy ones suggesting purslane, and growing between bricks in a pathway, were not only of one family but one genus. While the recognition of a plant as a spurge is not difficult, to relegate it to its proper position in a system, or still more to describe it, will test one's utmost skill in taxonomy. One curious fact should be added, namely, that in hot dry desert regions in the old world, they replace the Cacti of the New and imitate their concentrated forms.

Providence, R. I.

Ferns and Lime.—It is often assumed that all ferns love limestone and that certain species will not thrive unless in a soil of this nature. This was once said of the walking fern and it is still the custom to mix limestone, old plaster, etc., with the soil in that part of the fern garden where these ferns are to be placed. But since this idea became current the walking fern has been found on a large number of rocks that contain no trace of lime, and at present not a few believe that the reason for the occurrence of some ferns on limestone is the same as the reason for certain plants growing in alkaline soils or in deserts, namely, that they cannot hold their own against the tenants of other soils. Not only is this true that many ferns are not lovers of lime, but there are some species that cannot endure it. *Lomaria Spicant* and *Cryptogramma crispa* are reported as unable to survive if watered with water containing much lime.—*Fern Bulletin.*

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

A NATURE STUDY SOCIETY.—Prof. M. A. Bigelow, Teachers College, N. Y., has undertaken the formation of a society for the advancement of all phases of nature study and the cooperation of those interested in the work is requested. Prof. Bigelow will be glad to have them communicate with him at the address given.

THE WATER CLOVER.—There never can be rules for the making of common names. The common people will call the plants what they please. In the *Garden Magazine* we find *Marsilia quadrifolia* called water clover, a name that is quite descriptive, although *Marsilia* does not belong to the same grand division of the plant world that clovers do.—*Fern Bulletin.*

INJURED SYCAMORES.—Commenting on Mr. Elwyn Waller's note in the June number of this magazine regarding an injury to the sycamores (*Platanus occidentalis*) in New Jersey apparently due to frost, Mr. Chas. C. Plitt, notes the same appearance in the vicinity of Baltimore, Md. The editor, also, saw evidences of the same thing in Connecticut, later in the season. The injury seems to be very widespread, but as was suggested in the first note, it is due to bacteria and not frost. We are confirmed in this by Dr. M. A. Bigelow of the Teach-

er's College in New York who writes that the dead leaves were caused by the attacks of a fungus parasite. So far as we could learn in summer the only effect of the parasite upon the trees was to give them a temporary check. New and vigorous branches had risen above the zone attacked. This disease has not long been reported from America and at present has not reached the Middle West, so far as we are aware.

HABITATS OF CYSTOPTERIS FRAGILIS.—There are few ferns in the world more widely distributed than the common bladder fern (*Cystopteris fragilis*). It has been reported from Alaska, the West Indies, Cape of Good Hope, New Zealand, China, and Europe. Its predilection for moist rocks is well-known and in regions where such habitats are to be found, the fern is rarely found elsewhere, but in the woodlands that border the streams through the prairie regions of our Middle West, where no rocks are to be found, the fern grows in the soil like the lady fern usually does. In such woods this fern is usually the most abundant species, and frequently is the only fern to be found.—*Fern Bulletin.*

COLOR CHANGES IN WEIGELIA.—An interesting bush often found in the old gardens is *Weigelia rosea.* When its flowers open they are nearly white but they soon change to rose-color, hence the specific name. Several of our American bush honeysuckles (*Diervilla*) are closely related to weigelia and it is interesting to note that all have the same trait of changing color. The common bush honeysuckle (*D. trifida*) opens citron-yellow and later turns to red or scarlet, *D. rivularis* opens yellow and turns to dull red, *D. sessilifolia* opens citron-yellow and changes to a deeper shade of yellow, the lip becoming orange. In all the lower lip of the flower is most deeply colored. It is supposed that these changes of color in the flower are due to pollination and have been evolved as an aid to the visiting insects by showing them which flowers have been pol-

linated. The change, however, is doubtless due to a difference in the cell sap at different ages in the flower and would probably occur whether the flower was pollinated or not. If the insect is a gainer in the matter it is simply his good fortune.

FERNS AND DROUTH.—It is well known to botanists that drouth is very effectual in causing plants to flower and fruit, and the same thing seems applicable to the fern-worts. The behavior of the various species of *Marsilia* are quite in accordance with the rule. When growing in plenty of water they rarely fruit at all. Fruiting specimens must be looked for among the dilapidated specimens in drier ground. The same is true of *Pilularia* and the species of *Isoetes*. Some of the so-called "terrestial" species of the latter fruit at the beginning of the dry season, and then drop their leaves, but if supplied with water throughout the year do not drop their leaves and rarely produce spores. Other species fruit late in summer when most likely to be exposed to drouth. The fact thus illustrated is of wide application among the ferns, and may have an influence upon the production of such forms as *Onoclea sensibilis obtusilobata* and *Osmunda cinnamomea frondosa*. Many have conjectured that the last mentioned form is due to a fire sweeping through the locality, while others claim to have found specimens where there were no signs of a forest fire. Drouth at the proper season, however, might account for both occurrences. Prof. Atkinson has held that the *obtusilobata* forms of *Onoclea* and *Struthiopteris* can be produced at will by removing the early sterile fronds, but some of those who have tried to duplicate his results have been unable to do so. It may turn out, after all, that dry weather must be taken into account in producing such forms. Many other habits of ferns point to this theory. Practically all tropical ferns fruit at the beginning of the dry season, and our own ferns, with few exceptions, fruit when their habitat is the driest.

Everybody is familiar with the fact that specimens growing in dry ground or in sunlight will be more fruitful than specimens of the same species in shade and moisture. The whole subject is worth a careful investigation.—*Fern Bulletin.*

RICHWEED AND WOOD-CHUCKS.—Readers of Thoreau's "Walden" will recall that he early discovered the wood-chuck's fondness for beans for they nibbled off clean a half acre of his crop. Almost any plant may form food for this sly inhabitant of our fields but he has his preferences in the matter of diet as all of us have. Mrs. E. J. Smith, New Britain, Conn., sends us specimens of richweed or clear-weed (*Pilea pumila*) with the note that this is one of his favorites.

ANTIQUITY OF THE GINKGO.—The maidenhair tree (*Ginkgo biloba or Salisburia adiantifolia*) is one of the most interesting of trees. While it belongs to the division of the plant kingdom in which the pines, spruces and cedars are found, its leaves are broad and flat and, as both the common and one specific name suggests, are much like the pinnules of the maidenhair ferns. The tree is also worthy of notice because of the fact that it will grow in smoky regions where few of our common trees will thrive. It is apparently the only survivor of a race that once flourished over a wide area. Regarding this feature we quote as follows from Veitch's "Manual of Coniferae." The existing species is the sole survivor of an unknown number of others widely dispersed during geological ages over what is now the temperate and colder parts of the northern hemisphere. Fossil remains of Ginkgo have been discovered in systems that show its ancestral form antedates that of every living tree. It thus presents to us at least one form of vegetation that flourished on the earth when it was inhabited by unwieldly icthyosauri, gigantic toads and monster deinotheriums ages before man entered on his inheritance."

Yellow Trilliums.—Dr. W. W. Bailey writes regarding our recent note about yellow trilliums that he has twice seen a yellow form of *Trillium erectum;* once on Mt. Wachusett and again at Fredericton, New Brunswick. In the latter case it persisted for years.

Fasciated Composites.—We have recently received a fasciated specimen of the common ox-eye daisy (*Chrysanthemum leucanthemum*) sent from Ulster County, New York, by Mr. Elwyn Waller. While fasciation has been reported in many other plants, the composites seem especially prone to it. In some years or in some localities the black-eyed Susan (*Rudbeckia hirta*) affords many curious examples. Several years ago, the editor of this magazine described and figured various forms in *Meehan's Monthly.* In one the flower-heads were consolidated, but some of the stems were not, showing very plainly that the specimen was not an unusually large flower-head, but was really several heads joined in one.

Yellow Flowers from Red Ones.—The idea that we may expect white forms of flowers in those species with flowers of red, yellow and blue is as old as botany itself. The reverse, however, is not so certain. Most plants whose flowers are not normally white may produce red flowered forms, but blue forms of white flowers are exceedingly rare. In a majority of cases, the red flowers are due to the presence of a substance called anthocyan. If but a trifle is present the flowers may be pink; if more, deep red or dark purple. This coloring is not confined to the flowers, but occurs in the red and brown tints of leaf and stem, and a superabundance causes seeds and fruits to be black. Underlying this red color and closely connected with it, is a yellow hue and when, by any chance, the red is absent, the yellow comes out and becomes the dominant color. This is the explanation of the many yellow berried

forms of plants whose fruits are normally red. Thus the holly and winter-berry (*Ilex*) have yellow fruited varieties, and so has the belladona whose fruits are usually black. The yellow trilliums that are reported from time to time are without doubt due to this cause. If red were not such a rare color in our flora, it is probable that numerous other yellow forms would be known. Since white flowered forms are due to the absence of all color, it would seem that the red and yellow usually fade together for white forms of red flowers are much more abundant than yellow ones.

THE SUDDEN SAWLOG.—The so-called North Carolina poplar, a tree believed by some to be a distinct form of poplar and by others to be merely a staminate cottonwood, has the reputation of being the fastest growing tree in America. It is common to find trees that have attained heights of fifty feet in fifteen years. But even this marvellously rapid growth is both literally and figuratively put in the shade by the black or Norway poplar (*Populus nigra*) of Europe. According to *Forestry and Irrigation* a tree of this species has been known to grow to a height of 20 feet with a diameter of four inches at the base in three years. The tree has been called the "sudden sawlog" and comes pretty near deserving the name.

THE POPLAR.—This tree always comes to mind when the editor reads in Longfellow's "Voices in the Night" the lines

"And all the broad leaves over me
Clapped their little hands in glee
With one continuous sound."

It is almost worth while planting a poplar near one's dwelling for the cool sound of its rustling leaves in summer which move with the slightest breeze. The Roman's called some species of poplar, *arbor populi* and this is said to have given the name *Populus* to the whole genus reappearing in another form in the common name. There are many, howev-

er, who would derive the name from the popping sound made by the leaves. A still more appropriate derivation would be from the old word popple—to move quickly up and down, as a cork on the waves. Popple certainly has some connection with poplar, but whether popple was derived from poplar or the reverse is beyond our ken at present.

Cultivated Wild Flowers.—The people who do not stop to think—and there are many such—assume that there is some fundamental distinction between the flowers of the field and those of our own gardens. One class they are accustomed to call wildflowers, the other "tame" or cultivated flowers. But cultivation means something more than growing plants in a garden. Plants, like men are not cultivated by mere growth; there must be improvement as well. A wildflower that has been brought into the garden and made more valuable by deepening its color, increasing its perfume, multiplying its flowers or increasing them in size, is truly cultivated. We may even agree that doubling certain flowers is a phase of cultivation, but not all double flowers are cultivated, if by the term we mean improved. Imagine a double orchid, or iris! A double sweet pea or snap-dragon or columbine is simply a monstrosity, but a double rose, buttercup or daisy need not be so stigmatized, for in the first case, the beauty of the flower depends upon its form and in the second it depends in a measure upon the multiplicity of parts. The cultivated flowers, then, form but a small part of our garden flowers. The others may still grow wild, somewhere, and even the cultivated flowers were once in that condition. The parent of the "golden glow" rudbeckia is still most plentiful along our streams and swamps, its few-rayed flower-heads giving no visible hint of the relationship existing between them. A better division of the flowers would be into the native and exotic species, the exotics being all those that are not native

to our own particular region. When we investigate our flower gardens with botanical manual in hand we soon find that many that we prize most highly, if not native to our own region, are native to the next state or county. Yet there are many who consider that a plant has no beauty if it grows wild in the fields. We find a good illustration of this in a paragraph from a current nursery catalogue as follows: "We have recently received a long and indignant letter from a customer who complains that many of the plants we had sent him were wild-flowers, some of them growing in his own neighborhood. Two of the things he complained of were dogwood and *Lilium superbum.* Surely these fine things are none the less fine because they grow in many places. If we could find sufficient variety in the wild growth of our neighborhood we would give it the preference, as it would be certain to thrive in our climate and soil. Our customer complained that we fooled him with high-sounding names. Now we are not responsible for the names and we do not want to fool anyone, but we fear we must continue selling wildflowers."

THE TIME TO MOVE PERENNIALS.—A friend who cultivates many of our wild plants in his garden told the editor recently that he had discovered the proper time to move perennial plants. When asked when this time was, he replied "whenever you find them." There is a great deal of truth in this statement. Ordinarily gardeners, it is true, prefer to move plants in the late fall or early spring when they are dormant, or nearly so, but nearly any plant can be moved in full flower without loss if the cultivator will but take the necessary care of the plant until it gets settled in its new location. The essential things to be observed are to get as many of the roots as possible, to keep them cool and moist while out of the ground, to lose no more time than necessary in replanting, to shade for a few days if the sun is hot, and to water the plant

if needed. The editor has moved many plants the past summer, often when they were in full bloom without the loss of a single one. Plants to go a long way by mail are best sent in spring or fall, but in moving them from the field to your home, any time will do.

BIENNIALS ARE RARE PLANTS.—A writer in a recent number of *Nature Notes* holds that there are no true biennial plants and insists that if left to themselves all plants that are not strictly perennials will reproduce themselves within the year. The contention is that the reason our carrots, parsnips and the like are biennials, that is, take two years to come to maturity and ripen their seeds, is because we hold their seeds back in autumn and do not plant them until spring. In the regions to which they are native the seeds fall from the plant in autumn, begin to grow and enduring the winter as seedlings ripen new seeds within twelve months. That they appear adjusted to two years of life by reason of the nourishment which it is their habit to store in the taproot is no criterion, for the radish which fruits within a quarter of a year, has this same habit. It is well-known, as bearing on the subject, that certain annuals may be made to live in two years by sowing their seeds too late for fruition in one, while other annuals may be made to simulate perennials by preventing all fruiting. But casting aside all the plants that are not true biennials, according to our definition, we still have the century plants that are neither, annuals nor perennials but that still require several seasons for growth. These are usually called plurannuals. No doubt many other plants may be found that after all, seem to prefer two seasons in which to grow. At present a biennial is usually defined as a plant that requires two years in which to come to maturity. We may have to modify this and put it that a biennial is a plant that prefers the warmer parts of two years to come to maturity.

No Hornbeam Trees.—Those who speak of hornbeam trees are guilty of tautology for the word beam itself means tree. We see the same idea in the word, boom, applied to parts of a ship, and in the beams of our houses. Even sunbeams are said to be derived from this source.

Perennials Defined.—There is no doubt about a tree being a perennial. Year after year the same trunk puts forth new leaves, adds new twigs and for many years increases in height and girth. With the so-called herbaceous perennials, however, whose parts that carry them over the season, are under ground the case is quite different. Many of them are true perennials, and put new stems each year from identically the same underground parts, but there are many other plants called perennials, that produce new parts each year from which the plants arise. Most of our lilies are of this kind and so are the adder's-tongues. A single bulb of the common yellow adder's-tongue (*Erythronium Americanum*) may, at the end of the season, be two or three bulbs, none occupying the place of the original bulb. Such plants might almost as correctly be termed peculiar forms of annuals.

Our Unstable Flora.—In botanical works we often read of the "struggle for existence" among the plants, but a casual walk in the fields seldom reveals evidences of the struggle. This struggle is always going on, however, the big plants trying to choke out the little ones, the dry ground plants crowding the marsh plants and these latter in their turn usurping the habitats of the true water species. But when any of these become supreme in a locality, winners of the fight, as it were, they are victors only for a time. Rainfall, wind, sun, cold and many other agencies are constantly though slowly changing the very land itself and what is now the ideal habitat of a plant may in a few centuries hence be quite un-

suited to it. The tendency of all land areas is toward one of the other of two formations,—grassland or woodland. It is not a mere matter of chance which it shall be. A meadow in many parts of the Eastern States would not forever remain meadow if untouched by man. Slowly one tree after another would come in and at length it would become forest again as it was when man took up his residence in the region. On the contrary, the prairies of the Middle West would probably always be grass-land. Man, himself, finds it difficult to keep trees growing upon them. Such forests as are planted do not tend to reproduce themselves. It is a region in which grass is to be supreme.

Origin of the Name Linnaeus.—The world having recently celebrated the two hundredth anniversary of the birth of the great Swedish botanist it is interesting to record the origin of the family name. It is well known that the Swedish people in general have no family names, the son of Sven Carlson being known as Ingemar Svenson and the latter's son as Carl Ingemarson. When anyone rose above the mere peasant class it was usual for him to select a new family name and in this way Nils Ingemarson, the father of the botanist, when he entered the "gymnasium" took the name of Nils Linnaeus from a celebrated linden tree (*Tilia Europaca*) in the vicinity. This linden tree was very old and large and was regarded as a holy tree by the peasants. Before Linnaeus was born, two uncles, brothers of his grandmother, had also taken a family name from this same tree, calling themselves Tiliander, from the Latin for linden and the Greek for man. Still another branch of the family called themselves Lindelius, thus the tree bore at least three family names as well as its own fruit. The origin of the word, linden, is equally interesting. The Latin word for flax is *linum* and the word for thread spun from *linum* was naturally *line*. The thread-like inner

bark of the linden tree readily suggested the name it now bears. The tree is also called lime tree and this name may be traced to the same source as the others. It was formerly *line-tree.*

Helplessness of Cultivated Plants.—We rarely realize how helpless man has rendered the plants he cultivates by the centuries of protection from their weed enemies that he has given them. An experiment that well illustrates this point was made on one of the Government farms some time ago. A field about one acre in extent upon which wheat had been grown for forty years in succession was not harvested but allowed to stand and shed its seeds as it would. The next year a fair crop of wheat came up but the weeds were gaining the ascendency and by the fourth season all the wheat had disappeared from the field and the weeds held full sway. If man should suddenly disappear from the earth it is certain that his cultivated crops would soon follow him. And yet these very plants held their own against their competitors before man took them under his care. The reason they can no longer persist in the face of competition is not alone because they have grown weaker, but in a measure because the weeds have grown stronger. In protecting his crops man has constantly killed out the weak and least persistent weeds and only those were left to perpetuate their kind, that were able to elude man himself. One species, the self heal (*Prunella vulgaris*), which ordinarily grows a foot or more high has produced a variety so low that it is able to thrive on a closely mowed lawn. Darwin never considered the lawn-mower as one of the factors of evolution but undoubtedly this yankee invention has played its part in the great struggle.

EDITORIAL

"Lest we forget" we say again at the beginning of a new volume, that this magazine is not issued in July and August. During these two months, the editor, like the bee, goes in search of flowers and such sweets as he discovers are brought home to enliven these pages during the winter months. We can fairly promise that the present volume will be the best one yet and we hope every subscriber will send us at least one new name to add to our list. There are plenty of people yet who have never heard of this magazine. When everybody knows about it our circulation will allow us to give twice as many pages for the same price. Help the work along by mentioning the magazine to your friends.

* * *

In every issue of this magazine are articles or notes which we would like our brother editors of the gardening and horticultural press to see. In the immense mail that most of them receive, these small items are likely to be overlooked, and we shall therefore begin with this issue sending marked copies of such items to all. If any of these notes appear worth reprinting or commenting upon, we trust that credit will be given this magazine for them.

* * *

Not long ago, a subscriber to the *Nature-Study Review* stopped her subscription because she could borrow a copy of a friend, and in a letter to the editor asked who received the profits from his magazine. To this the exasperated editor replied that thus far the magazine had not only failed to make money but in three years had cost him individually about a thousand dollars. The editor further intimated that he did not intend to stand such an arrangement much longer, but that is because he has been an editor for only three years. Af-

ter a longer apprenticeship with pencil and shears, he will begin to realize that his case is not unlike that of other editors in the same line. The trouble with all of us is that there are not enough people in this country interested in our various specialities to form a remunerative subscription list. We Americans are fond of boasting of the intelligence of our citizens, but the intelligence of the vast majority does not go far beyond mere animal acuteness. After intelligence comes culture and as a nation we are as yet far from being a cultured one. We have a fair number of cultured individuals and it is to this steadily growing circle that publications dealing with things entirely aside from bread and butter or mere entertainment, must appeal. The editors of the scientific periodicals of the present are in a very literal sense pioneers and subject to quite as many hardships, though of a different nature, as were ever experienced by those rugged folk who cleared the forests and subdued the wildernesss of the New World. In botany, at least, there appears never to have been a publication devoted to plants and their surroundings until the advent of THE AMERICAN BOTANIST. Agricultural and gardening magazines have flourished for many years, and some few periodicals devoted to descriptions of new species or investigations of their minute structure have attained a respectable age, but in ecological botany this magazine seems to be the pioneer. We cannot expect, at present, more than enough subscribers to enable us to pay the printer's bills, but we do expect to keep right along in this line until we have made a permanent demand for such a magazine. The editor is personally acquainted with many of his subscribers and almost without exception they are people of influence in their respective communities. And he is pleased to fancy that their interest in real botany is an indication of the qualities of mind necessary in such positions.

New Books for Winter and Spring

The following list contains many recent books in addition to those better known. They will be sent postpaid at the prices quoted. We can supply any other book at publisher's prices. Reviews of those marked with a star will be found in **American Botanist.**

*Seed Dispersal. Beal	$ .40
*Seed Travellers. Weed	.30
*How to Know the Butterflies. Comstock	2.25
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*The Book of the Iris. Lynch	1.00
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*The Book of the Wild Garden. Fitzherbert	1.00
*The Book of Shrubs. Gordon	1.00
*How to Know Wild Fruits. Gridley	1.50
*Mountain Wildflowers of America. Henshaw	2.00
*Our Northern Shrubs. Keeler	2.00
Our Native Trees. Keeler	2.00
*Plant Breeding. DeVries	1.60
*With the Trees. Going	1.00
With the Wildflowers. Going	1.00
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*The Garden Month by Month. Sedgewick	4.00
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Guide to the Trees. Lounsberry	1.75
Guide to the Wildflowers. Lounsberry	1.75
*Southern Wildflowers and Trees. Lounsberry	3.50
Field-Book of American Wildflowers. Matthews	1.75
How to Know the Wildflowers. Dana	2.00
*According to Season. Dana	1.75
New England Wildflowers. Bailey	.75
Botanizing. Bailey	.75
Blossom Hosts and Insect Guests. Gibson	.80
Gray's Manual	1.75
Wood's Class-Book of Botany	2.25
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Our Ferns in their Haunts. Clute	2.00
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CONTENTS

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SPECIAL NOTICE.—This magazine is issued in two half-yearly volumes of five numbers each. Subscriptions $1.00 a year. All subsriptions must begin with a volume. To avoid the loss of numbers to regular subscribers, the magazine is sent until we are notified to discontinue and all arrearage paid. No one receives the magazine free except by special arrangement.

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Helianthus Grosse-Serratus.

THE AMERICAN BOTANIST

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OUR PRAIRIE SUNFLOWERS.

BY WILLARD N. CLUTE.

THE name *Helianthus,* by which the sunflower family is known among botanists, was very evidently given to the plants in allusion to the resemblance of their flower-heads to the sun, for when the word is dismembered it is seen to consist of the Greek words *helios,* the sun and *anthos* a flower. The circular clusters of disk florets and their surrounding halo of yellow ray-flowers are certainly near enough in appearance to our conventional idea of the sun to merit being named for it, and it is quite possible that the two kinds of flowers found in each head, the ray-flowers and disk flowers, have also received names from this resemblance, but the plants have other traits that link them with the god of day and with other forms of blossoms might still be sunflowers. Many of them set leaf and flower to face the sun in the early morning and as he slowly describes his arc through the sky they as steadily follow and face him. Since one is supposed to grow like what he contemplates, it is pleasing to fancy that this turning toward the sun through the long ages of sunflower evolution has been the determining factor in giving form to the blossoms.

The sunflowers were the original fire-worshippers. Few plants, at least in our part of the world, love light and warmth more. By right they should all come into full bloom on midsummer day instead of opening their blossoms so late in the year that there is barely time for ripening their seeds before frost. Theirs is the full enjoyment of summer, however, and during the hot season they wax strong and vigorous—putting up their tall stems that are later to be crowned with their

splendid clusters as a possible farewell to their favorite season.

When we recall the sunflower nature it is no surprise to find the race most abundant in the dry prairies of the Middle West and in the barrens of the Southern States. A cloudy and dripping sky has no charms for them and but few have adapted themselves to the conditions necessary to the extension of their range to the Atlantic seaboard.

To those who have never seen the prairie species, the word, sunflower, usually calls up the image of that coarse denizen of back yards and ash-piles *Helianthus annuus.* This, however, is regarded by many as an interloper in our territory, properly belonging in Brazil, and no more to be considered typical of the race than the average Brazilian would be of our own. In the typical prairie sunflowers, the disk is reduced to the minimum and the chief glory of the flowers resides in the long and broad ray-flowers. From tip to tip of the rays, the flowers are often more than five inches across and of this diameter the disk seldom occupies the space of an inch. Great diversity of branching is found in the various species. Some bear only a few large flowers at the top of the stem, others branch from the very base, making a tall pyramid of bloom.

The brightness which the sunflowers give to the early autumn days, has made them prime favorites with the gardener. Various species, but these not always the best, are to be found in the catalogue of every up-to-date nurseryman. One of the most frequent is *H. orgyalis* a fine plant whose long, very narrow leaves makes it most conspicuous among the other broad-leaved members of its tribe. Another species that presents as great a contrast is *H. mollis* with broad downy leaves of silky softness. The majority of the species are rough and harsh to the touch, and *Helianthus scaberrimus,* as its name indicates is the roughest of the lot. Its heads are of medium size and have brown disk florets instead of the

usual yellow ones. Another species in all the dealers' catalogues is *H. maximiliani.* It is a fine late species well worth planting. The Western sunflower (*H. occidentale*) whose medium sized flowers have a tinge of orange in them is the least leafy of our native sunflowers. In sterile soils the leaves are practically all at the base, and the slender stems, often five feet high bear several flower-heads on stalks so fine that the flowers seem floating in air. The name of showy sunflower is given to *H. laetiflorus* and it is well deserved. In this group of showy species the descriptive term could only be applied to something out of the ordinary. Its sole imperfection is that its flowers are comparatively few in number. *Helianthus giganteus,* as its name indicates is a gigantic species as to stature, with flowers not much inferior to those of *H. laetiflorus.* It is often confused with several species that at first glance seem identical with it. One of these, however, *H. grosse-serratus* need never be mistaken, for taking all things into consideration it is our handsomest native species. The stem is smooth and glaucous, branching profusely and covered in September with a multitude of large bright yellow flower-heads. The leaf is peculiarly serrated and the plant may be identified when not in flower by this single characteristic. The accompanying illustration, much reduced, was made from a small lateral branch springing from the axil of one of the stem leaves. The plant grows to a height of eight feet or more and when in full bloom is exceeded in beauty by few plants, wild or cultivated.

FLOWERS OF A DRY LAND.

BY CHARLES FRANCIS SAUNDERS.

TO the Eastern herborizer, used to a country where the absence of rain for three weeks is akin to a calamity, the Southern California landscape in September before any winter rains have fallen and after four or five months of drought, is

surprising in the abundance of its plant life in flower. These autumnal bloomers are not the struggling starvelings that one might naturally expect a drought-baked soil to produce, but cheerful warriors of the sun, sturdy and full of vim, brought up—the perennials at least—to hunt deep and far for water—not supine waiters for it to be poured upon them. As a matter of fact, however, after a normal winter rainfall, the subsoil loses its moisture quite slowly. In digging some post-holes, as I have been doing recently, I have had to break the hard, dry surface ground with a mattock; but at twelve to eighteen inches down the earth becomes appreciably damp, while at two feet it is mellow enough to be easily tilled. So the thirsty roots have less distance to delve than one might imagine.

This robust autumn flora does not as a rule excite the admiration that the delicate beauty of the spring flowers awakens; nevertheless I find it of exceeding interest. From the veranda where I write, I see stretches of unbroken land densely covered with the tall, wand-like, leafy stems of *Heterotheca grandiflora,* one of the commonest of autumn flowers here and near cousin to the golden aster of the East. Topped with panicles of bright yellow blossoms, patches of it present at a distance somewhat the effect of goldenrod. The latter is here somewhat of a rara avis, but we occasionally come upon one species (*Solidago Californica*)—truly a rod of gold, the flowers being borne in long, slender spikes.

Very abundant at this season is a tall, snaky looking composite, with slender, leafless branches darting this way and that, bearing of mornings small, bluish white stars of bloom like depauperate chicory flowers. Indeed until I examined it critically one day, I took it for granted that it was some species of *Cichorium;* but it is generally different, being the closely related *Stephanomeria virgata.* The flowers close at midday, and in the afternoon the branches become more or

less showy in the sunshine with fluffy balls of pappused seed poising for flight.

A composite characteristic of the deserts of Eastern California, not infrequent in the sandy washes of the hills near Pasadena and which makes a bright show in the September sunshine, is *Lepidospartum squamatum*. It would be a boon if someone would give it an easy common name, for it is too much to expect the non-botanical to be interested in a name like that. It grows in clumps, the mass of stiff, green branches being leafless like so many dormant sticks, but when the flowers appear—rayless but the disks a vivid yellow—the bushes are changed, as by a Midas touch, to gold. Unfortunately for the posy gatherer, the plant exhales an insidious, disagreeable odor not unlike soap-fat, and a glorious bunch that I picked for home decoration on the day of my first acquaintance with the flower, had to be dropped as soon as plucked.

Another beautiful composite that blooms only after the dry season is well under way, is *Senecio Douglasii*, whose graceful, lemon-yellow blossoms, the size of half a dollar, surmount a plant as graceful with grayish green, finely cut foliage. But showiest of all the composites is the sunflower—the same *Helianthus annuus* that forests the levels of the Middle West with its stout, arboreal stems and supplied the old time Indians with fuel, food and hair oil. Out here on the Pacific Slope, it makes cheerful thickets along washes and by neglected roadsides, but I have never seen it attain the luxuriant growth it reaches in Kansas and Nebraska "sloughs," where it overtops a man on horseback.

Besides composites—and there are many more of such dry weather lovers than I have space to enumerate—there are now abloom several interesting plants of other orders. One that fairly dyes the dry plains blue in many spots is a species of blue curls (*Trichostema lanceolatum*)—a bushy annual with the curious curled stamens so prominent in the Eastern

species of the same plant, and with a peculiar, heavy, terebinthine odor which is not unpleasant if you happen to like the smell of furniture polish. More agreeable to most olfactories is the minty aroma of its cousin, *Monardella lanceolata,* which grows in similar situations, and bears neat little heads of rosy purple flowers. The fragrances of the plants of arid regions make a study in themselves, and lend a special poetic touch, I think, to a tramp through the wild places. Only a few are positively disagreeable to everybody; most are pleasant, and some are delicious. The leaves of the California Sage (*Artemisia Californica*), which comes into bloom in the fall, give out a particularly exquisite aroma when crushed. As its spicy incense arises from beneath my feet or carriage wheels, my spirit joins with that of the ancient Hebrews who gave thanks to God, that among other blessings, He had sent them sweet perfumes.

Pasadena, California.

SOME AFRICAN FLOWERS.

BY DR. W. W. BAILEY.

DELIGHTFUL as it must be to see new countries and to study different peoples, travel, itself, is often deterrent. Given even those coupons upon which utter freedom of action is dependent, there are many annoyances incident to journeying which make one quite content to stay at home. Apart from mosquitos, flies, tarantulas, scorpions and creatures of larger and more determined mien, there is that miserable survival, the custom house in some countries, the passport in others. If not confronted by imperative officers obdurate to the blandishments of a cigar, a paternal government receives them on their return as hardened malefactors. Hence one concludes that it is pleasanter to travel by paragraph than by passage; by lines of print than by lines of railway. By this means, or by steamer, one escapes all sorts of aggravations and dangers, short of

accident, and allows the writer to do the hard work and to incur the nuisances and perils while he, himself, luxuriantly enthroned in his easy chair enjoys the comforts.

To be a proper cicerone, however, the writer of travel should not only be a natural as well as a skilled observer, but should possess an agreeable and grapic style so that what he seees the reader also observes and what he concludes may be considered it authoritative. There are writers of voyages and travels over whom one falls into uneasy sleep. They lack even the power of inducing dreamless slumber. Others there be who delight us from title-page to colophon; we wonder, indeed, how they can make so much of so little.

Such a writer is Sir Harry Johnson who, a few years since, gave us those sumptuous volumes "The Uganda Protectorate." It is not our province or intention at this late day to review this grand work, but to merely call attention to some of its botanical features. Lesser libraries cannot possess it, nor can the ordinary reader and student, so some account of its contents may be useful. Let us call attention to some of the more remarkable plants mentioned.

First among these everywhere in the dense forests about the Nyanza lakes is a perfectly gorgeous species of *Erythrinic,* a genus of the pea family represented by some handsome plants in our own Southern States. This African kind produces beautiful clusters of orange or flame-colored blossoms on the familiar style of *Wistaria* and *Laburnum.* In the lowlands, also, along the lakes is everywhere seen the graceful papyrus, the plant which should be apotheosized by the press as the origin of paper. Marion Crawford in his "Rulers of the South" describes it as growing about the river Arethusa in Sicily and as being no longer found in Egypt. However that may be, it is common enough on the Upper Nile where its umbrella-like tufts are a charm forever.

Africa is a country of surprises. Only a few years ago

we were told that Tanganyka was the highest mountain on that continent. Now, almost under the equator are found the sublime Ruwenzori a range about thirty miles in length rising to 20,000 feet in altitude. This tremendous height, surpassing the Swiss Alps, it will be observed, is not so very far short of the Himalayas—except their very highest peaks. To conceive of these figures, let one remember that Mt. Washington is but a little over 6,000 feet—a mole-hill to these grander mountains.

The equatorial situation of the Ruwenzori carries its flora to a great height and gives one a grand opportunity to study altitudinal zones as contrasted with those of longitude. Naturally at the middle elevations it assumes a temperate character, while the sub-alpine region is carried far above the alpine or even lifeless districts of our higher hills. One finds buttercups, for-get-me-nots, brambles, sunflowers, anemones and the like as high as 10,000 or 15,000 feet above the sea. Mingled with the familiar temperate types, however, are peculiarly African forms. Most startling to the reader, as they must be to the observer, are giant *Lobelias,* from ten to fifteen or twenty feet in height. Fancy a cardinal flower becoming almost a tree—and clothed with gorgeous flowers. They are not unique in flowers alone, but most extraordinary in appearance. As the long-pointed dracaena-like leaves fall in succession the lower part of the stem is left bare, so the plant, with its tuft of foliage and flowers looks precisely like a dragon tree, the shape of the blossoms, alone, giving it away.

This is a very suggestive fact. It shows how types have persisted for countless ages all over the world and how environment has acted to differentiate them. Also it points out conclusively that some time or other, in an extremely remote period, there was more intimate connection of lands than now. Even the tyro in science recognizes a *Lobelia,* be it here or

there, the type is pronounced and nearly unchanging. It is in less important details, as stem or leaves, habit of growth and height that time and surroundings have effected a modification.

Africa is the special home of the heath plants, not necessarily *Ericas* or *Callunas* but their natural relatives. The Cape region is particularly full of them but in the mountains of Uganda they assume an arborescent form and beauty. Here, too, are tree-like groundsels, and cinerarias. Those of the Ruwenzori are yellow, but there are whole fields of the related *Emilias,* purple or lavender in color.

Space does not permit anything like an exhaustive account of the many plants described or figured in these volumes, like the splendid *Spothodea* or the huge *Euphorbias.* The country is a paradise of color in plants and birds. Yet, strange to say, the author tells us that it is all lost on, at least some tribes of natives. They appear color-blind, or at least indifferent to its charms which is, to be sure, another thing.

In the eden-like lower country, so that the picture may present a reverse, is found the puff-adder, graphically figured as "death." Its bite is absolutely fatal in an hour or less. In consideration of such a creature, we are confirmed in our belief that for us, arm-chair travel is the most desirable.

Brown University, Providence, R. I.

CONCERNING WILLOWS.

BY FRANK DOBBIN.

IN taking a stroll in the country, especially if it lead near a stream, one cannot fail to note the number and variety of our native willows; varying all the way from a shrub three or four feet in height to a tree seventy or eighty feet high with a bole sometimes three feet or more in diameter. Of wide distribution, the willow may be found from the forests of Florida

to the frozen wastes of arctic America, where it is reduced to a small matted shrub a few inches in height.

The grace and symmetry of their foliage add much to the beauty of our winding streams and make them desirable trees for planting where there is sufficient moisture in the soil to insure their growth. Not less are they valuable for planting along streams where the rapid current is likely to tear away the banks. Their extensive root system binds together the soil and in a measure checks the inroads of the stream.

In attempting to identify the species of willow inhabiting any particular region one must be constantly on the lookout for hybrids, as many species hybridize freely with others. In this respect they resemble the oaks but probably hybridization is more frequent between them than between members of the genus *Quercus*. Perhaps this may in a measure be accouted for by the large amount of pollen produced by each staminate tree or shrub, and the ease with which it is carried by the wind to the waiting pistillate blossoms of other individuals.

The first willow that one beginning the study of the genus would be sure to notice would be the shining willow (*Salix lucida*) its beautiful shining leaves appearing as if coated with varnish, making it a conspicuous tree wherever it grows. Unfortunately it is not common, at least in most localities. The white willow (*S. alba*) is another noticeable tree, having its leaves covered with a white, silky down. It is an introduced species and said to hybridize with some of our native willows. Another foreigner which has now made itself thoroughly at home with us, is the crack willow (*S. fragilis*). This is a tall, handsome tree which was planted at an early day in eastern Massachusetts from whence it has widely spread. It no doubt gets its name of crack willow from the ease with which the twigs may be separated from the main stem; only a slight blow being sufficient to break them off. After a hard storm in which the branches are threshed by the wind, the ground

under the tree will be found thickly strewn with the broken twigs.

One of our most common willows is the one known as Bebb's willow, (*S. Bebbiana; S. rostrata*). It is a shrub or small tree and unlike most of its relatives it is often found growing in dry situations, sometimes on rocks where the soil is poor and scanty. It is easily recognized and when once known need not afterward be confused with other willows.

The heart-leaved willow (*S. cordata*) is a shrub sometimes reaching a height of twelve feet and can be recognized by its large serrulate and persistent stipules. This species is said to occasionally cross with the glaucous willow (*S. discolor*) the latter a fine, large-leaved species having the under side of its leaves glaucous and nearly white, and making it easy to recognize at a distance if the wind be blowing enough to turn the leaves. Another species not easily mistaken is the prairie willow (*S. humilis*), which has pubescent twigs and long leaves, with slightly inrolled margins, covered beneath with a dense, grayish down.

In swamps and bogs one sometimes meets with the small hoary willow, (*S. candida*), usually not more than five feet in height. This is a rarity with us, and I know of only one station where it inhabits a sphagnum bog along with some of our native orchids and other rare plants.

Perhaps the most common of all the shrubby forms is the silky willow, (*S. sericea*) which inhabits swamps and the margins of streams almost everywhere from Maine to Michigan. Of tree forms probably the most abundant is the black willow (*S. nigra*) or its variety *falcata*. This is a beautiful tree and well worthy of preservation. Its narrow scythe-shaped leaves and its graceful manner of growth make it a conspicuous tree along our river courses.

Time and space would fail me to speak of all the numerous forms of this interesting group of plants, but its species are of

such wide distribution and grow in such abundance that their study is comparatively an easy matter to all who have access to field and stream.

Shushan, N. Y.

BREAKING INTO BOTANY.

BY T. J. WILKINSON.

ALLOW me to make a few suggestions that may be of interest to beginners in botanical knowledge, taking my own case as illustrative of the matter. Some years ago I found that a knowledge of the flora would add interest to outdoor life and with this in view I purchased some of the popular hand-books on flowers but soon found they were not what I wanted. I purchased some of the older botanical text books (Wood's, etc.) and then learned how to make plant analysis and in correct botanical language. This ended my second year in pursuit of flower knowledge. Next spring with note book in hand I commenced a more scientific campaign. I wrote in botanical terms a description of my new finds, then with Gray's Manual in hand I traced the plant and made much progress. Some plant problems were unsolvable but each season I attacked the unsolved problems of the year before and some I succeeded in solving, while many I did not. A few of my problems I asked the Academy of Natural Science to solve and Mr. Stewardson Brown always kindly assisted me, but as I dislike troubling others I kept up my investigations of the book store and finally located Britton & Brown's "Illustrated Flora." This I purchased early in the summer and it is to this 3-volume publication that I am most indebted for renewed interest and added knowledge. It solved the difficulties of an untrained, undirected amateur, and has given me the key I long wished for.

I do not think any one with a love for the science would misuse the Britton & Brown volumes; by this I mean just turning the pages to find the picture of the plant in hand. An intelligent plant analysis is far more interesting but after

deciding from Gray's or Britton's Manual the name of the plant, then as a court of appeal turn to Britton & Brown.

Philadelphia, Pa.

[Mr. Wilkinson's account of his efforts to get acquainted with the plants will have a familiar sound to a large number of our readers. It is the road many of us have traveled and the same that many others have before them. Our schools and colleges are teaching botany, but it is not the kind of botany that is calculated to make the general observer more deeply interested in the flowers. Ordinarily the botanical course begins with seeds and seedlings and runs on through the form and structure of roots, buds, stems and leaves, until the beginner, who took botany because he thought it had something to do with flowers, begins to wonder whether flowers are a part of botany. From a pedagogical standpoint there can, however, be no criticism of this course as compared with the older study of plant analysis and flower dissection. The province of school botany is not to produce botanists but to train the observing and reasoning powers of the pupil, give him exact ideas of the structure and evolution of plants, and perhaps incidentally to inculcate an interest in the plants as individuals. The botany that the general public is interested in—the public that buys such books as "How to Know the Wildflowers"—is seldom taught in up-to-date schools. It usually has to be picked up here and there as chance affords. It thus happens that nearly every town has several people who would be glad to take up the study of plants if they only knew how to begin, but who have become discouraged and have concluded that botany is not for them. To many such, the so-called popular flower-books like Dana's "How to Know the Wildflowers," Lounsberry's "Guide to the Wildflowers," Matthews' "Field Book of American Wildflowers," Henshaw's "Mountain Wildflowers of America" and others have partially opened the way to the subject, but all of these books have two

great drawbacks. They treat only of the showy flowers and they do not fit the student who becomes interested for going further. The only real way to become skilled in the identification of plants is to get a scientific manual and begin at the beginning. To those who would try this way we can recommend Wood's "Class-book of Botany." Any person of average intelligence who will read through the chapters in this book and answer the questions at the end, will be equipped to identify practically any plant in his vicinity. Of course, like Mr. Wilkinson, he will find some problems hard to solve, but continued study will give the power to solve them. The "Illustrated Flora" mentioned contains illustrations of all our flowering plants and is excellent for reference but its price puts it out of the reach of many. It may be said, however, that no single book written will give one a complete survey of botany. For the mere naming of plants a good manual like Gray's Manual or Wood's "Class-book" is sufficient, but one who is making a dead set at naming the plants of his vicinity can look ahead to the time when there will be no new plants to name. Then what? When this question presents itself it is usually answered in one of several ways. The student may become a specialist in some line that attracts him, such as the grasses, carices, willows or hawthorns; he may turn his attention to the flowerless plants and devote his attention to mosses, ferns, fungi or algae; he may become a nomenclaturist and spend the rest of his days wrangling about the mere names of plants; or he may become interested in plants as living things—in ecological botany, if you will—and find the field of study ever widening before him. Then it is that he will find a new need for books and in time he will make place on his shelves for Kerner's "Natural History of Plants," Goebel's "Organography," Lubbock's "Flowers, Fruits and Leaves," Rendle's "Classification of Flowering Plants," Henslow's "The Making of Flowers," Darwin's

"Origin of Species," De Vries' "Species and Varieties by Mutation," Henslow's "The Origin of Floral Structures" and many another of like merit as well as lesser works. Each one adds something to the botanical story. The editor's library, which makes no pretensions to completeness, contains five or six hundred volumes on botany and would contain as many more if the circulation of this magazine was large enough to permit of his buying them. But knowing of the good things between the covers of those he already has, he is inclined to envy the students who have these things still in store for them until remembering what these same individuals have missed he is not sure that they should not envy him.—Ed.]

Plants that Seldom Fruit.—The knowledge that the common white potato (*Solanum tuberosum*) seldom produces fruit, is so widely diffused that the barrenness of the plant causes no comment. Indeed, since the tubers in a measure function as seeds we have partially transferred the name to them. It is usual to speak of potatoes intended for planting as "seed potatoes." Real potato seeds may be found, however, if one searches the potato-fields long enough, and from such seeds new strains of potatoes may be raised. The potato is not alone in its strange ways. Many other plants, of which the ground-nut (*Apios tuberosa*) and lily-of-the-valley (*Convallaria majalis*) are good examples, rarely produce seeds. It is noticeable that all such plants have other excellent and efficient means of propagation and it may be assumed that finding one method requiring less effort than the other they have gradually adopted it. When plants have more than one means of multiplying, as, for instance, seeds above ground and tubers or runners below ground, they usually subserve two distinct uses. Those below ground serving to multiply the plant in its own locality, and those above giving it a chance of gaining a foot-hold in distant lands.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

YELLOW POND LILY.—Although the yellow pond lily (*Nuphar advena*) does not attract much attention now-a-days, it was once esteemed as a vegetable in this country. The Indians ate great quantities of it and there are indications that they cultivated it in a certain rude way. The thick but porous rootstocks are the parts eaten. They are said to be slightly sweet and glutinous. The seeds seem to have been occasionally eaten, also, being first parched. Among the common names of this plant are splatter-dock, frog lily and brandy-bottle, the latter in allusion to the shape of the pistil.

TREE ROOTS AND GRASSES.—The well-known difficulty of keeping up a good lawn beneath trees, has usually been ascribed to the shading of the grass, to the absorption of the moisture by the trees and to the withdrawal of the plant food by the tree roots. Some experiments recently made, however, seem to point to a more fundamental cause. In this competition of grass with trees it is not always the grass that suffers. In several cases trees were found to be very materially affected by the grass growing beneath their branches. On the other hand, not all trees have a harmful effect upon other plants though some certainly do. *Potentilla fruticosa,* a shrubby cinquefoil, appears to be unable to live in the shade of the butternut (*Juglans cinera*) though it thrives in the same locality under

other species of trees. In the case of the grasses it was found that certain species of trees, notably tulip, dogwood, maple, cherry and pine seriously checked the growth of grasses grown in their vicinity and this injurious effect seems to be due to the excretion of substances by the trees that are harmful to the grasses.

Planting Bulbs.—Whether one be of the race dubbed "dry-as-dust" botanists or merely a flower lover he will make no mistake in planting at least a few spring flowering bulbs. Coming into flower, as they do, close on the heels of winter, no other flowers can take their place. There is quite a long period in early spring when these are the only flowers to be had. If one has a surfeit of the more familiar crocuses, tulips and hyacinths, he may find new delight in the less prominent blossoms like winter aconite, *Tritelias*, crown imperials, *Chionodoxa*, *Scilla*, *Camassia*, and the hosts of others in every dealer's catalogue. None of them cost very much and the interest and pleasure one gets from their appearance above the last snow-bank of spring is out of all proportion to their cost.

The Productiveness of Plants.—It is estimated that the American corn crop for this year will be nearly three billion bushels, and the wheat crop is known to amount to more than five million bushels. These are but two of the many crops of fruits, roots and seeds that will be gathered and yet they all represent a surplus of over and above what the plants needed for themselves. Most astonishing of all is the fact that all these millions of tons of food products were made by the green cells of plants from the carbon dioxide in the air and the water from the soil. All animal life, whether man or lower types, are food destroyers and absolutely unable to produce food, even for themselves. The plants thus carry a double load and must make the food for all living things. One of the chief constituents of plant foods, carbon, exists in the air

in very minute quantities combined with oxygen to form carbon dioxide. There is about three-tenths of one per cent of this in ordinary air and the plants have to sort over enough of it to make all the immense crops gathered by man and his little brothers in feathers and fur.

Names of Rudbeckia hirta.—When a plant becomes common it soon gets a common name, or several of them. This is true of *Rudbeckia hirta* which within the memory of man has spread eastward from the great plains until there are few places in the Eastern States where it is not a familiar weed in meadows and along roadsides. In the North it has been dubbed yellow daisy, black-eyed Susan and ox-eye daisy, the latter more properly applied to *Chrysanthemum leucanthemum*, and in the South it goes by the names of cone-flower, nigger-head and golden Jerusalem. In some places it is called simply rudbeckia, but by any name it would thrive as well.

A New Clover Wanted.—At a recent meeting of the Vermont Botanical Club, H. M. Seely called attention to the fact that while red clover has an abundant supply of nectar, our domesticated nectar-gatherer, the honey-bee, has a tongue too short to reach it. He therefore suggested that it would add greatly to the honey crop if we should breed up a race of red clover with shorter corollas in which the nectar would be accessible. By measuring the tongues of the bee it is found that the carolla would have to be not longer than twenty millimeters. It is probable that corollas of such length may be found in our fields at present and need only to be selected. The growing of such a clover would not be beneficial to the apiarist alone, but would greatly increase the tonnage of hay throught the increased production of seed due to the pollinating of the flowers by the visiting bees.

Late Flowering Catalpas.—In this country, the catalpa trees are usually done flowering by the middle of July, but according to *Nature Notes* they flower a month or more later in England. Several trees are reported as blooming the first week in September.

An Albino Calopogon.—Three years ago I found a pure white flower of *Limodorum tuberosum* (Calopogon). I have never found one since nor have I ever read of an albino form occurring in this species. Does anyone else know of one?—*Mary E. Hatch, Cambridge, Mass.*

Peanuts A Foot Long.—The *Garden Magazine* does make some most astonishing breaks in its botanical information. In the October number it is stated that the long seed-pods of *Catalpa speciosa* look like peanuts and scatter seeds all winter and that the tree is not as showy as *C. bignonoides.* This statement is quite true except that the pods have not the slightest resemblance to peanuts, the seeds are not scattered until spring, and the tree is the showiest of our native catalpas,—at least in the region where the catalpas are native.

Seeds of Carolina Poplar.—Of late years a hardy and very rapid species of poplar has been extensively planted under the name of Carolina poplar. Some contend that this is a separate species of *Populus* but most nurserymen are convinced that it is merely the staminate form of our common cottonwood of the Middle West. It is well known that the male and female trees of this species differ considerably in the form of the leaves. According to the *Garden Magazine* the Carolina poplar is objectionable because of the "silky pappus shed in summer," but if, as the nurserymen aver, this is a male cottonwood it is a little difficult to see where it gets that silky pappus to shed. If any of our readers know of a seed-bearing Carolina poplar we would be glad to hear from them.

SEED DISPERSAL IN CASSIA.—The great pea family (*Leguminosae*) has evolved numerous devices for the distribution of its seeds. The tick-trefoils (*Desmodium*) have a trait, so common among the composites, of catching into the clothing of animals for transportation, and various locusts (*Robinia*), while not able to produce samaras have, nevertheless, produced winged fruits, for the pods split open and each half blows away with its quota of seeds clinging to it. Fleshy fruits, in the ordinary sense, are rare, but there are not a few species in which a part of the pod is made edible to the delectation of some mammal and the consequent distribution of its seeds. The great majority of the family appear to depend upon the splitting of the pod to sufficiently scatter the seeds. In some this splitting is a tame affair and the seeds lazily tumble out on the ground, but in others the pods split with a sharp snap and jerk the seeds for some distance. This is true of partridge pea (*Cassia chamaecrista*) which is able to throw its seeds several feet by this means. The pods are so constructed that as they dry an unequal tension is produced and when this reaches the breaking point, away go the seeds. The force of the discharge is increased by the twisting of the pod which thus forms a veritable catapult.

PLANTS AND STERILE SOIL.—It is apparent that botanists have not yet got to the bottom of the great question why certain plants grow in sterile soils. It is assumed, with pretty good reason, that some plants have taken up their abode in such soils because at least one phase of the struggle for existence is less intense. Although the cactus has to provide for a drouth and resist evaporation, as well as protect its supply of moisture from thirsty animals it does not have to compete with grasses, and burdocks and many another plant that would crowd it in more fertile soils. There are other plants, however, that seem to prefer the barrens and when removed to

good soil and protected from their enemies do not appreciate it. Of such plants, the butter-fly weed (*Asclepias tuberosa*) the partridge pea (*Cassia chamaecrista*) and the Western sunflower (*Helianthus occidentale*) may be taken as examples They will grow in good soils, but they are never so showy as when, contending with the inhospitable phases of nature. In good soils they run to leaves. Desert and alpine plants are well-known to have larger flowers in proportion to their size than plants in milder regions and if we are to make them at home in our gardens, we must not favor them too much. They are plants looking for trouble and not quite satisfied unless they find it.

POLLINATION OF DATURA.—The fact is pretty generally accepted that the showy corrollas of flowers have been called into being for the purpose of securing the visits of pollinating insects. Certain it is, that plants without showy flowers are seldom visited by bees and butterflies and few if any wind pollinated flowers are showy. Notwithstanding this, the flowers of the common jimson-weed (*Datura stramonium*) seem to be pollinated before they open and so have no need of opening at all. The corolla is in one piece, as in the morning glory but the five petals that compose it are plainly to be traced. In the center of each petal, toward the base, is a long deep well of nectar, and as the flower opens it gives out a strong sweet odor that is unmistakably for the attraction of insects, and yet, if we look at the very instant of its unfolding, we find that the anthers are open and some of the pollen already shed upon the stigma. Unless pollen brought from other flowers is more powerful on the stigma than its own pollen, it is difficult to see how the color, nectar and odor serve the plant.

EDITORIAL

The return of the "subscription season" always brings to us, along with sundry specimens of the "coin of the realm," many kind wishes from subscribers for the continued growth and success of the magazine. This building up of a subscription list among people interested in our kind of botany is slow business, however, and we shall doubtless have to rely upon the co-operation of our friends for some time to come if the magazine is to be made in any sense a howling success. We believe that the kind of botany we are concerned with is ultimately to be the principal kind of botany but until that time arrives we shall have to make common cause and win adherents from those who at present are not enough interested in plants to subscribe for any kind of a botanical magazine. Unless one has an independent income it is not possible to make a big magazine on a small subscription list. An appreciation of these facts has led several of our subscribers to take an active part in extending our circle of readers, and we greatly appreciate their good will. If readers generally realized that our success means a bigger and better magazine for them without increase in price, we are sure they would miss no opportunity of recommending the magazine to their friends.

* * *

It is very apparent that the establishment of a parcels post in this country would give a great impetus to gardening and horticultural affairs. At present a great deal of the money you spend with your florist and seedsman, goes to pay the needlessly high rates of postage. If we but had a parcels post, such as nearly every other civilized country has, flowers, seeds and fruits would be cheaper and certainly more abundant. As it is at present our government has established a parcels post with some foreign countries and it now costs less to send

a parcel from Chicago to Berlin, Germany, than it does to send it from Chicago to New York. The establishment of a domestic parcels post would mean reduced rates on botanical specimens sent in exchange and a reduction on the cost of such bulbs, seeds and plants as you may wish to purchase from the florist and nurseryman. Very little except good can result from an American parcels post, and we hope our subscribers will talk and vote parcels post until we get it.

* * *

As 1908 approaches, increasing uneasiness is being manifested by American botanists at the prospect of being obliged to describe all new species in Latin after that date as agreed at the Vienna International Botanical Congress. Of course only those are complaining who failed to become intimately acquainted with Caesăr, Cicero, and the rest of the old Romans of their school days. Some are strongly insisting that as we are an English-speaking nation, able to look after our own flora, there is no need for us to obey this new rule, quite forgetting that if this is true, the Japanese, Russians and Persians have just as much right to describe their new species in their own language, much of which looks in print as if it were a cross between the alphabet and the multiplication table and is just about as decipherable as the label on a pack of firecrackers. No, let us have the Latin and then even these English-speaking, species-making, name-tinkering nomenclaturists will have to learn but one extra language in order to keep in the game. To most of us, whether we know anything more than dog-latin or not, the prospect of trading off French, German, Hungarian, Norwegian and Italian plant descriptions for descriptions uniformly in Latin, is quite attractive. Nor can we feel much sympathy for the scientists who for nearly a generation have confused and confounded us with the proteus-like changes of their "stable nomenclature." They may now get a taste of their own medicine.

BOOKS AND WRITERS.

Readers of Dr. E. F. Bigelow's "How Nature-Study Should be Taught" will have no difficulty in recognizing the same point of view in his recently issued "Spirit of Nature Study." The book might be described as a bundle of suggestions for teachers of the subject. It will not tell them how to teach, but it ought to start several new trains of thought. The book contains many sound ideas mingled with much that is whimsical, but all told in a manner that makes reading a pleasure. A number of fine photographs of nature study classes in a proper environment add to the book. A. S. Barnes & Company of New York are the publishers.

The fact that ecology is rapidly taking its place among the other branches of botanical science is indicated by the increasing number of books devoted wholly or in part to the subject which are beginning to appear. Old books are being re-written from the standpoint of ecology and new books are dominated by it. One of the best of these books now at hand is Clements' "Plant Physiology and Ecology" recently issued by Henry Holt & Co., New York. It is probably the first real attempt in America to make a book for college use along such lines. The matter is arranged under such heads as the water of the habitat, adjustments to water, light, temperature and gravity, adaptations to water and light, the origin of new forms and much about plant distribution. The book is well written although the author shows great fondness for unusual scientific terms, and the "experments" outlined are, many of them, not experiments at all. The illustrations, 125 in number, are excellent and of much aid to the beginner in the study. The book is an octavo of 300 pages and is well worth a place in the library of all interested in ecology.

Choice Hardy Perennials -- For Outdoor Planting

Below we give a partial list of the showy wildflowers we are offering for fall and spring planting. They have been selected with regard to their decorative qualities and will be found among the best for planting in borders and herbaceous grounds. All are first-class, full size, strong, healthy plants with their tissues stored with reserve plant food. If planted now they are sure to bloom next season.

Lepachys pinnata, Drooping Cone-flower. A tall plant with numerous large erect yellow flower-heads, the rays long and pendant. One of the earliest of the sunflower type to bloom. Fine for the border.

Liatris scariosa. Blazing Star; Gay Feather; Button Snakeroot. · Handsome plants with wand-like stems strung with globular flower-heads. Plant often five feet high with showy purplish flowers. Very attractive to butterflies. Will thrive in poor soil and bloom from August until frost.

Helianthus occidentalis. Western Sunflower. One of the finest and earliest, blooming from July until September. Leaves nearly all radical. Flower heads borne on tall wand-like stems that make them seem to float in the air. Flowers medium size, golden yellow.

Helianthus grosse-serratus. Tall sunflower. Absolutely our finest native sunflower. Flower-heads often four inches across, the disk small and the rays long and showy. Reaches a height of ten feet in good soil, forming a perfect pyramid of bloom. Stems smooth, purplish, with narrow leaves which show off the flowers to advantage. Blooms in September and October.

Helianthus laetiflorus. A tall slender species with few branches, bearing at top a cluster of very large flowers. Leaves ovate-lanceolate and flowers very showy. Fine for the border.

Solidago rigida. Stiff Goldenrod. A large smooth-leaved species resembling the sea-side goldenrod (S. sempervirens). Flowers is erect panicles, large for the genus and the whole plant quite unlike the typical goldenrod in appearance.

Heliopsis laevis. Ox-eye. A leafy-stemmed plant like a sunflower in appearance with medium sized copper-yellow flowers. Excellent for the border.

Silene Virginica. Fire Pink. One of the handsomest of the genus with flowers of vivid scarlet. Grows in sun or shade and not particular as to soils. Perfectly hardy. Blooms in June and July.

Pentstemon pubescens. Beard Tongue. A hardy plant of sterile soils with racemes of purplish blossoms like the snapdragon and interesting for the hairy tongue-like fifth stamen. Fine for sloping banks and the rockery.

Digitalis purpurea. Foxglove. This is an improved variety of the common wild foxglove of the Old World. Has long spikes of large bell-shaped purple and white spotted flowers. The clumps we offer are six months old and well established.

Var. Maculata superba. A fine spotted form.

Var. Monstrosa. Large thrifty plant of excellent form.

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Single plants, 20c each, prepaid.	Any six plants, 10c each, prepaid.
Any two plants, 15c each, prepaid.	25 plants, $2.25.
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Extra large plants will be sent by express for the same price if purchaser cares to pay for transportation.

SPECIAL FREE OFFER.

With every new subsciption to **The American Botanist** at the regular price of $1.00 we will send prepaid your choice of any two plants in the above list. For every dollar's worth of back numbers ordered you may also select two plants. Be sure to name second choice in case we happen to have sold out the others. Plants ordered too late for fall planting will be sent early in spring.

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The AMERICAN BOTANIST

CONTENTS

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WILLARD N. CLUTE EDITOR

SPECIAL NOTICE.—This magazine is issued in two half-yearly volumes of five numbers each. Subscriptions $1.00 a year. All subsriptions must begin with a volume. To avoid the loss of numbers to regular subscribers, the magazine is sent until we are notified to discontinue and all arrearage paid. No one receives the magazine free except by special arrangement.

SAMPLE COPIES.—One cannot always judge of a magazine by a single number. Those who receive extra copies are asked to give them a careful examination. We know when a plant lover becomes familiar with the contents of this magazine he invariably becomes a subscriber. A single number may often be worth more than is charged for a year's subscription. The full set is almost a necessity to the plant student.

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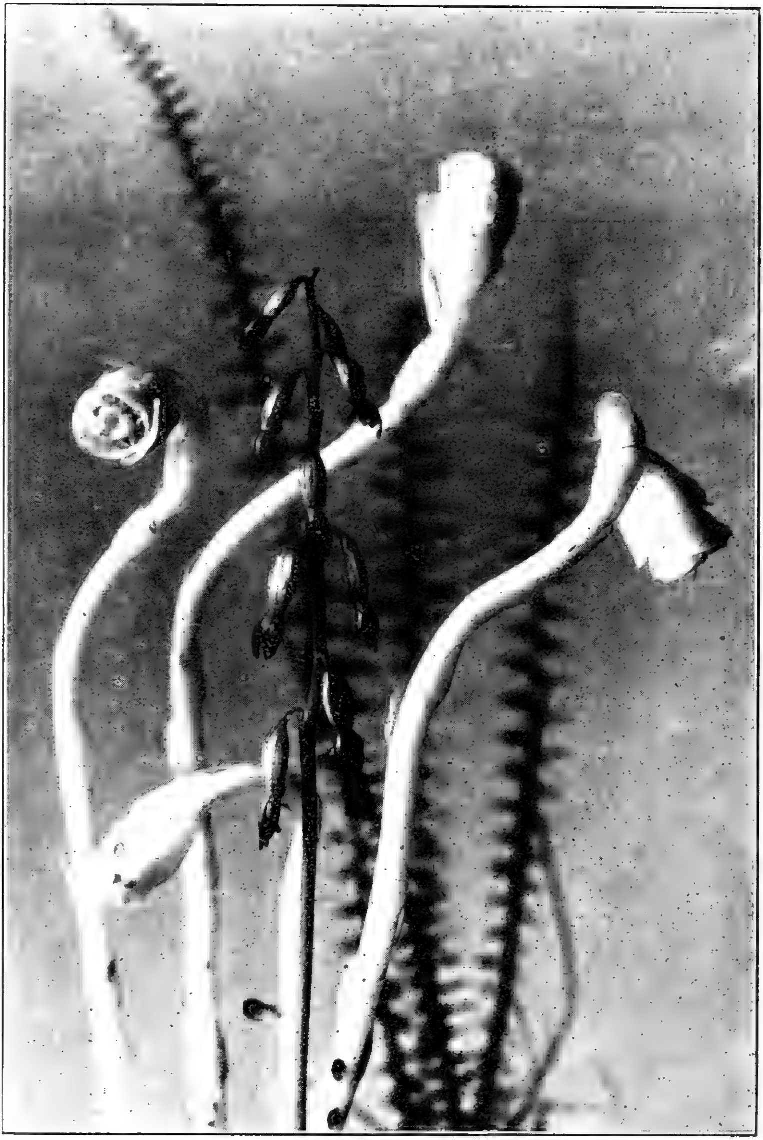

Corallorhiza and Indian Pipe.

THE AMERICAN BOTANIST

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GHOST PLANTS.

BY GRACE GREYLOCK NILES.

PLANTS without green leaves, are always degenerates. They are beggars, or burglar plants, and are distinguished by the fungus-like growth of their deeply buried roots, and their corpse-like blossoms. The destitute organism of the parasite or saprophyte, is easily recognized in many of our common woodland plants. The family of Monotropaceae consists of twelve species, all of which are parasitic. One of the species most frequently seen, is the Indian pipe, or corpse plant (*Monotropa uniflora*), which grows among decayed leaves in dark woods. The blossoms readily suggest a clay pipe, with its nodding bell-shaped bowl on the end of a long waxen pipe stem. The Indians knew the flower long ago as the calumet or pipe of peace. Others called it later the flower of immortality, or the ghost plant on account of its pure white garb. The whole plant turns black when bruised, and as soon as the waxy petals of the flowers have fallen, the seed capsule becomes erect, and looses the pipe-like character of its flowering season. Wanderers through the August woodlands scarcely recognize these as flowering plants, and believe them to be some sort of fungus.

Parasitic plants have a degenerate nature, and take their nourishment from the vegetation about them. The branded group contains not only the Indian pipes, but several other species from other families, such as brome-rape, dodder, pine-sap, and beech-drops. Even the highly organized Orchid family has several species on the very threshold of degeneracy.

Degeneracy of plants is not a process of one season but rather a result of countless generations of change and adjustment to environment. As we may read in the history of a nation the general character of the human beings of which it is composed, so from the foliage and blossoms of plant families we may read the story of their struggle for existence. In their leaves, roots and blossoms the keys of their professions, progressions, or degeneration are to be found.

Normal plant life abounds in green coloring matter (*chlorophyll*), which pervades the cellular tissues of both stem and leaves. This substance aids the plant in forming its nourishment from the water taken form the soil, and the carbon-dioxide in the air. A plant which has become either a parasite, or saprophyte, takes its nourishment either from living things or from dead products in the soil, and therefore has no use for green leaves which soon degenerate to small bracts. True parasitic plants, live upon the stems or roots of other *living* plants; while the saprophytes, take their food from the organic material in the soil. Some plants may be in a degree both parasitic and saprophytic.

A Western species of the Monotropaceae is remarkable for the deep rose-carmine color of its fleshy spike of flowers. It is locally known as the snow plant (*Sarcodes sanguinea*). The spike is often over fifteen inches high, and one and a half inches thick. The stem is clothed with fleshy scales, the upper ones passing into strap-like bracts. The flowers vary from sixty to a hundred growing in circles around the stem—five or six in each circle. The blossoms when fresh are erect upon fleshy pedicels one and a half inches long.

Sarcodes, unlike *Monotropa*, does not turn black on being bruised; and when dried still retains the carmine coloring. A few specimens of this strange plant were collected by Mrs. Lewers in Washoe Valley, near Frankfort, Nevada, about May 10th, and came safely to me. They delighted the Nature

Study classes, and brought a strange story from the alpine slopes of the distant Sierra Nevadas, where they grow near the snow line, often peering out of the rich humus in the shade of green forests as soon as the snow melts. The roots form a yellowish fungus-like mass, similar to the roots of Indian pipe, although much larger.

Another interesting parasitic plant, seldom discovered, is the pine sap (*Hypopitys Hypopitys*), closely allied to the Indian pipes. It grows beneath hemlocks or in mixed wood. The whole plant is of a sulphur or pinkish color, instead of white. The flowers, which grow in a nodding raceme appear more like scales than delicate blossoms. The stem is fleshy, and ornamented with scales as in the Indian pipe.

The cancer-root (*Thalesia uniflora*), of the Broom-rape Family is frequently met with in rich woods, and on the edges of marshlands, among decayed brush heaps. Its bell-shaped flowers are pinkish in color. The roots consist of a large mass of pink, fleshy nodules. The Orchid family produces several species which are destitute of green leaves, and whose flowers are strange and degenerate. The roots are always coralloid masses, similar to those of *Monotropa*. Some of these plants are root-parasites, while others are saprophytes.

The coral-roots (*Corallorhiza*), of the Orchid family produces roots which resemble coral masses. These plants are not regular in their habits, especially in the flowering dates. There are nine species of *Corallorhiza* on our Continent, four of which are natives of New England. It is reported that it is impossible for *Corallorhiza* to absorb substance from the soil except through and by the agency of the fungus attached to the roots. Another Orchid that does not produce green leaves is the ghost orchid (*Cephalanthera*), found in the dark fir-forests along the Pacific slope in California, Oregon and Idaho. The whole plant is pure white, with three to five dilated sheathes, instead of leaves. The roots consist of wavy

cylindrical masses of a yellowish-brown. *Cephalanthera* is thought by some to be parasitic, but is declared not to be so by Dr. D. T. MacDougal, who is most familiar with its habits and home life. It is, however, saprophytic, and possibly in a certain degree parasitic. A peculiar characteristic of this strange orchid is that it is self-fertilized.

Many other plants are on the verge of becoming beggar plants. Our *Gerardias* are slowly changing into parasites. The roots of *Gerardia flava,* recently examined, revealed the presence of sucker-like disks which were attached to the roots of *Vaccinium vacillans.* These plants have the power of developing these clinging disks whenever they come in contact with other roots. Often, however, they attach themselves to their own roots, showing that they have no power of distinguishing the roots from which they would steal nourishment.

New York City.

OVERCOMING DIFFICULTIES.

BY M. F. BRADSHAW.

IN studying plants we often note the struggle for existence and the various methods adopted, nearly every plant having a way of its own. The commonest and most approved is that of forming seed and for this end insects are attracted by many devices, to pollinate the blossoms.

I think there is no plant I ever saw that was able to make seeds in greater numbers than the common morning glory of our gardens. The plants, coming up every day in the year, in this climate, are a pest equal to the most persistent and insidious weeds. But we have one, *Ipomoea hederacea*—commonly called the blue moon flower and not a moon-flower at all as it blooms in the early morning like any other morning glory—that forms no seed.

The blossoms are so numerous that the whole surface of the plant is nearly covered and they are the most heavenly blue with a hint of crimson underneath. As the day advances the blue grows purplish, then purple, and by afternoon the flowers are crimson. It is a favorite vine for an arbor or porch as it covers in a few weeks anything that stands in its way. Some of the vines stretch out on the ground for rods, others mount to the roofs, then reach to the tree branches, and when you look again they are to the top of the largest tree, fairly covering and bending it down.

To tell the truth, the vine, beautiful and cleanly as it is, is a perfect pest for it wants to possess the earth and it succeeds if you allow a root of it to retain a foothold.

I never thought much about this characteristic till I began to collect seeds; then to my surprise I could not find any though there had been millions of blossoms. In the three years I have been interested in seeds, I have succeeded in getting about a teaspoonful only. Then came the question, why were there no seeds when the pink morning glory a few feet away seemed to be wholly resolving itself with seed. A little observation and the story was told. The flower is very large, about the size of a large coffee cup and is frequented by humming birds and bumble bees. Now these fellows were never once seen to go into the cup of the corrolla in the polite and proper way, but always pierced the base of the tube, going quickly from one to another. This was a cute and quick way to get a meal of honey, but the moon-flower must perforce find a new method to perpetuate itself. And so for how many ages, who knows, it has evolved for itself a way to cover the earth and has grown robust and able to choke out anything that comes in its way—*sans* seeds.

Orange, Cal.

CHICKORY.

BY DR. W. W. BAILEY.

THE chickory is a Composite, that is, of the same huge family as the dandelion, daisy, sunflower, aster and golden-rod. Most of our readers probably know that in all such plants the apparently single flower is really that kind of a cluster called a head. In other words, a large number of small florets, in the chickory and dandelion all strap-shaped, in daisy, etc., with tubular disk florets and big white rays, are aggregated together and surrounded by a calyx-like involucre. These Composites are high-class plants; indeed, the highest. In any lately arranged herbarium or flora or Manual they are found heading the system. Each individual floret shows marvellous adaptations to the special end in view and all work together in a republic or community where division of labor tends to the good of the commonweal. In their specialization, indeed they call to mind the extraordinary development of bees, ants and other similar creatures.

While the flowers of chickory are ordinarily blue, they are sometimes pink and of course, now and then white. Indeed, albinos occur among flowers of any color as one may see white cardinal flowers, gentians, self-heal or harebells. Pretty as our plant is when the flowers are open, it is a troublesome weed and unsightly, when, as in the afternoon they are closed. The old description of Asa Gray "stems twiggy" then hits it off very well.

Its leaves make a capital salad when young as was known to the Romans and is mentioned in Horace. It is said by Gerard in his quaint old "Herbal" that "the leaves of chickory are boiled in pottage or broths for sick or feeble persons that have hot, weak or feeble stomachs to strengthen the same."

In a paper by Maurice G. Kains, issued some years ago by the United States Department of Agriculture, we learn that "At the present day its young leaves are considered equal

as a salad to those of the endive to which it is closely related. In this form it is known as *barbe de capucin*. Under special cultural processes, accidentally discovered and long kept secret by the discoverer, M. Bresiers, the famous witloof of the Dutch is produced. The tender young roots, when boiled and served with butter and pepper are considered a great delicacy by many Europeans, especially the Belgians. The green leaves, when cooked in the same manner as spinach, except that two waters are used, rival the justly popular dandelion greens."

We learn also that in some parts of Europe a blue dye is made from the leaves, by much the same process as that followed in the manufacture of the still extant woad dye with which the ancient Britons stained their bodies in times of war. It is employed, also to impart a dark color to, and increase the bitter qualities of certain liquors, such as porter, "for which purpose it is less harmful than quassia which is also used extensively as a substitute for hops in many beers, ales and porters."

Popularly, chickory is best known for its employment as a substitute or adulterant of coffee. We are told that "during the great blockade of Napoleonic times, when coffee, tea and cocoa could not be easily procured, the demand for an infused beverage led to extensive adulterations and substitutions of various kinds, the principle of which, in the case of coffee was made of chickory. The people having become accustomed to the use of chickory, either pure or mixed with coffee, during the continuance of the blockade, still continued to use it in the succeeding times of peace. Its use as a beverage on the continent (of Europe) is now as well established as tea or cocoa and forms an unique example of the creation of a taste for an adulterant which afterwards demanded even a complete substitute."

To the true coffee-lover, the above statement seems in-

credible for if there is one thing that its votary demands just right without foreign admixtures, it is coffee. He may use it according to fancy, with or without cream or sugar, but he peremptorily calls for coffee, not chickory, beans, barley or prepared saw-dust.

It will be a surprise to many to learn that chickory is quite largely cultivated in this country from Massachusetts to California and Oregon. For what purpose it is grown we do not learn, but a field of it, unmixed with weeds must be a delight to any lover of form and color.

Brown University, Providence, R. I.

THE STORY OF THE VEGETABLES.

AGE, which tinges with romance many of the commonest things of life, invests even the vegetables of our kitchens with a certain dignity when we know something of their origin and history. I confess, when I think of the centuries during which some of these have contributed to the energy of the race, I feel that "a dinner of herbs" becomes indeed a symposium with the spirits of the time. Dainty romancers would feed their heroes on nectar and ambrosia, but as a matter of fact it is such plebeian fare as peas and beans, onions and cucumbers and buttered parsnips that enabled Alexander to conquer his world, and that have fed poets from Homer to Kipling.

If the esteem of man is to count for aught, no vegetable can boast of a more honorable history than the onion, which has probably been more widely grown for the table than any other plant that we know; for these sleek, rotund bulbs are the result of millenniums of persistent culture. Its native land is shrouded in mystery. Perhaps it was Syria or India; but certainly it found its way to Egypt at an early day, for it is represented on monuments which show it to have been culti-

vated there two thousand years before Christ. We know too, that this pungent vegetable has place in those pleasant memories of Pharaoh's land which were awakened in the children of Israel during their wanderings in the wilderness. Latter day Egyptians endued the onion with something of a divine nature and rendered to it especial homage. So Juvenal, alluding to this superstition in one of his satires, speaks of Egypt as a country where it is dangerous

> "To violate an onion or to stain
> The sanctity of leeks with tooth profane."

No less venerable than the onion is the nutritious lentil—more prized in the old world than in the new. It, indeed, has been found in the remains of the Swiss Lake dwellings of the Bronze Age. The Romans called it lens, and the lens of modern science is named from its resemblance to the smooth, double convex seed. Lentil seeds, in days of old, were made into the most nutritious of flours, and were also stewed as a pottage. The mess of red pottage for which Esau bartered his birthright, was undoubtedly of lentils. At the present day, the Hindus regard the lentil as of all foods the best for long journeys or hard work.

Another peculiarly Oriental vegetable is the cucumber. A favorite in the East since the earliest times, it is yet planted inPalestine by the acre, forming a staple of diet among the poorer classes. The imagery of Isaiah is familiar to all—"as a lodge in a garden of cucumbers." It is known to have been cultivated at least thirty centuries ago in India, which is perhaps its native land, spreading thence east to China and west to all Christendom.

When our Aryan ancestors left the cradle of the race and made their prehistoric invasion of Europe, peas and beans doubtless formed part of their diet, for these vegetables have been cultivated from before the memory of man—peas, like lentils, occurring in the remains of the Swiss Lake-dwellers.

Both peas and beans were not only eaten as vegetable, but were dried and ground into meal, and doubtless Caesar's bread was composed in part of pea flour. England got her first peas from Holland not many centuries ago; and coming so far and costing so dear, they were at first only accounted "fit dainties for ladies." Soon, however, their use spread, and before potatoes became a common diet, peas formed a main article of food with the British working classes. The "Pease porridge hot, pease porridge cold" of children's games. would seem to date back to those early days when such a dish was as much a matter of course as the Scotchman's bowl of oatmeal. Like oats too, peas soon showed their value as food for horses. So in "A Midsummer Night's Dream," Bottom in his capacity of an ass, makes out but poorly with fairy fare, lamenting that he "had rather have a handful of dried peas."

The bean of history is the broad or Windsor variety, known botanically as *Vicia Faba*—a native, it is thought, of South-western Asia or Northern Africa, introduced into Britain by the Romans and extensively grown in the Old World, for the entertainment of beast as well as man. To this bean the ancients attached some mystical virtue—black beans being thrown over the head at the Latin festival called Lemuria, to lay the ghost of the departed; and the "Iliad" speaks of their employment in sacrifices to the gods. The Greeks, moreover, used beans in their elections by ballot; and this custom seems to have furnished the reason for Pythagoras' forbidding them to his disciples, being a figurative way of saying "the philosopher should not mix in politics."

The American summer is, as a rule, too hot for the successful culture of the Windsor bean, so in this country it is comparatively little known. The lima and the different varieties of kidney beans—the common field, garden, snap, and string beans—which are the customary sorts on American tables, are all natives of the New World.

To lands across the sea we are indebted for the cabbage, which still grows wild on the sea cliffs of Europe, though the wilding is but a poor substitute for the fat heads of the garden. Barbarian man of prehistoric days doubtless found its pungent leaves grateful to his scurvied system after the dark, hungry days of winter; and when he learned to make a garden he gave cabbage an honored place. Its cultivation antedates history, and cauliflower, brussel sprouts, and kale are all developed from the same stock with it.

The culture of the parsnip, another European, goes back at least for two thousand years, but its cousin the carrot is still quite a stripling in the kitchen garden of the ages. The carrot's original home appears to have been the British Isles, but like the prophet in his own country, it was unregarded until cultivated varieties were introduced in Queen Elizabeth's time from Holland, where the improvement of the wild plant seems to have begun. The exceeding beauty of the foliage attracted attention at first quite as much as the tastiness of the root, and the ladies of King Charles I's court frequently wore carrot leaves instead of feathers as an adornment.

The beet, asparagus, lettuce, celery, and parsley are all of ancient cultivation and have reached America with the white men. Asparagus is native to both Europe and Asia, its wild home being sandy river-banks, meadows, and the shores of the sea. It was as great a favorite with the epicures of Greece and Rome as with us. Lettuce is not now found in a wild state, but is thought to be of East Indian origin. Its use as a salad is very ancient, and it is known to have been served at the feasts of Persian kings at least four centuries before the Christian era.

Parsley has played quite an important part in human affairs. Its native habitat is the region of the eastern Mediterranean, where it loves the abiding place of old walls and rocks. It would seem to have been used, at first, not as we now em-

ploy it—to garnish dishes and flavor viands—but to bestrew tombs. It was thought to be associated with the powers of evil, and an ancient historian attributes a certain panic that befell a Greek army to some mules laden with the unlucky herb. According to the folk-lore of the Old World, the devil takes tithe of its seed, and a bed sown to parsley is accordingly believed to come up one-tenth short. To cut parsley, the superstitious say, may cause one to be crossed in love; while to transplant it is a sure fore-runner of ill fortune.

Corn, the most distinctly American of all our vegetables, is, appropriately enough, of American origin, but strange to say no one knows the particular country of its nativity, for white men have never found it growing wild. The evidence points to Mexico or Peru as its probable first home. It was a cultivated plant among the Indians upon the discovery of America, and it is from them that the knowledge of its usefulness has been obtained.

Of American origin too, are potatoes, both sweet and white, though, as in the case of corn, it is not definitely known from what particular section the original stock of either came. The Spaniards found the sweet potato in cultivation by the aborigines of tropical America; and enjoying its chestnutty flavor when boiled, they brought specimens home to Spain about the year 1519. Thence it was carried to other European countries, becoming known there before the white potato—the roots, steeped in wine or made into sweetmeats, being regarded as restoratives of lost strength. The potato of literature, until the middle of the seventeenth century, was always the sweet.

The elevated valleys of Chile, Peru, and Mexico were probably the cradle of the white potato. It was in extensive cultivation by the Indians in Columbus' day and it is believed to have been transported from Peru to Spain early in the sixteenth century. Authorities differ as to its introduction into England, but perhaps the credit is due to Sir Francis Drake

in 1586. The old herbalist, Gerarde, was one who grew it in his garden as a mere curiosity; and being particularly pleased with it as a plant, he had a flowering branch of it represented in his hand when his portrait was painted. It was not until the latter part of the seventeenth century that the value of the tubers began to be generally appreciated and then only as cattle food. It took an Irish famine to demonstrate its usefulness in supporting human life, and to give to our language the term "Irish potato."

The baby of our kitchen garden is the tomato, the use of which has become prevalent only within the memory of the people now living, who can recall the time when it was called "love apple." A native of the west coast of South America, it was brought to Europe by the Spaniards about the year 1583. In Walton and Brumbaugh's "Stories of Pennsylvania," a letter is quoted dated 1685, written by a little back-woods maiden to her relatives in England, which well represents the popular opinion of this vegetable until comparatively recent years. "We have great big love apples," she writes, reciting the wonders of their garden; "they are almost as large as an apple. They grow on a bushy plant which starts from a seed in the spring. Uncle James found them last summer among the Indians. Mother says they are poison if we eat them, but I guess nobody would want to eat them. They are just pretty to look at."

"God does not give man bread," says the proverb, "but a plow." So the vegetables as we know them to-day, are not as they came from the Creative hand. Many of them all but inedible at first, have become as they now are by long years of culture, and the story of the vegetables is but another case of the faithful servant and the talents. The forefathers of our race did not become discouraged with the unpromising gifts of nature, but by patient and intelligent application wrested sweetness from the bitter herb and fruitfulness from the bar-

ren branch. When I remember this, my kitchen becomes a temple and the steaming pots censers of incense, lifting my heart up from the sordid and low to the high places where the winds of life are stirring.—*C. F. Saunders in Young People.*

ADVANTAGE OF PRACTICAL KNOWLEDGE.

IT is a good thing to know ideas. It is a good idea to know things. The scholastic work of yesterday dealt with abstractions. The school training of today has to do with the concrete in constantly increasing proportion. It has finally dawned upon the educational world that mental discipline can be given and mental power increased by systematic thinking and study of definite objects as well as by a contemplation of classic poetry and philosophy. The primary purpose of education is to make the mind a strong, thinking machine. If there is any kind of discipline which, while giving good mental discipline will also add knowledge needed in the essential activities of life, this eminently practical age wants it.

A knowledge of Greek poetry is a pleasing accomplishment, but it does not help a man to plow a furrow, to drive a nail or to run an engine. The demand for practical education has become tremendously great in recent years. By the term "practical education" that is meant, which, while giving discipline, adds an equipment of knowledge about things which a man must know, or should know, to conduct his business to the best advantage.

The manual training schools and the agricultural colleges came in response to the demand for this kind of education. These schools have demonstrated their worth. Their critics have been disarmed by the great body of trained men which they annually turn out upon the farm and into the shops. The sturdy sense of this age finds as much music in rattling looms and clattering reapers as in the twang of Apollo's silver bow.

The modern educated farmer may be ignorant of Plato's somewhat speckled philosophy, he may not be up on the scandalous biographies of heathen gods, he may not know about Helen's beauty or Achilles' heel, but he knows the difference in soils, he knows the beautiful processes by which the seed goes from budding sprout to splendid stalk and ripening grain. He knows how to milk a cow and how to select one. He knows the blessings of clover fields and the reasons why they are blessings. Being educated, he sees back of plant and flower and waving grain field, and cloud and sunshine and storm, a reason, always, and because he has reasons, the comfort of living is greater and the profits of living is enhanced.—*Hon. H. C. Adams.*

THE SINGLE-LEAVED LOCUST.—Through the kindness of Mr. H. C. Skeels of Lockport, Illinois, the editor was recently able to add a specimen of the single-leaved locust (*Robinia pseudacacia monophylla*) to his other botanical curios. This plant is all respects like the common locust except that instead of the leaf being composed of several pairs of pinnae, it consists of but one leaflet. At first glance this single leaflet might be mistaken for a simple leaf, but a closer examination shows that it is jointed to the stem or rachis, as all proper locust leaflets should be. In this respect it resembles the orange tree, which is usually supposed to have simple leaves, but which actually has pinnate ones with a single leaflet. There are species of orange with trifoliate leaves, but our common species is unifoliate. The unifoliate locust tree differs from the type in producing slenderer thorns, but as these thorns are parts of the leaf, it is to be expected that whatever influenced the disappearance of the other leaflets would also affect the thorns.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

FLOWERS OF THE DOGWOOD.—The summer and autumn flowers are perfected with great rapidity but those which appear early in spring often require almost incredible periods of time for their completion. W. C. Morse who has been studying the buds of the flowering dog-wood (*Cornus florida*) reports in the November *Ohio Naturalist* that these flowers begin to be formed early in July though they are not to open until some eleven months later.

RAMIE.—Since mankind left off the wearing of the skins of animals for clothing, he has had to depend almost entirely upon the five textiles, wool, silk, cotton, hemp and flax. Only three of these are derived from the vegetable kingdom and although there are nearly half a million different species of plants it is not likely that our supply will be much increased from this source. It requires peculiar characteristics for a vegetable fibre to be useful in spinning and weaving. It must be long, fine, stout but flexible, and easily removed from the plant and spun into thread. The stout bast fibres in the bark of various plants are likely to be our future source of textiles as they have been in the past. Many plants whose fibres might be used are known, but the difficulty of separating these fibres from the other tissues of the stem is a great drawback to their use. In recent years great progress in this direction has been

made with the ramie plant (*Boehmeria nivea*) a member to the nettle family belonging to the same genus as our common false nettle. In the market it is often called vegetable silk and in its native country, China and the East Indies, is known as grass cloth. Fabrics made from it are strong and white with a pearly or silky lustre.

PROLIFEROUS VENUS FLY-TRAP.—In the *Botanical Gazette* for November Dr. John W. Harshberger illustrates a flowering shoot of the Venus fly-trap (*Dionaea muscipula*) in which the bracts had produced a tuft of leaves in their axils instead of flowers. These tufts of leaves were removed and potted and soon became new plants. In this connection it may be noted that a near relative of this plant, the round-leaved sundew (*Drosera rotundifolia*), has the same habit but in this case, the old leaves falling on the soil developed new plants from their margins just as the leaves of begonia or *Bryophyllum* are known to do. This peculiarity of the sundew was first reported by Mr. James A. Graves.

PROTECTION AGAINST COLD.—Even in the plants of cold climates which have become adjusted to the extremes of cold by the survival of the best for uncounted centuries, many forms of protection are necessary; in fact, these very methods of protection have enabled the species to survive and the lack of such features frequently account for the inability of tropical plants to extend into even temperate regions. The intense cold has the same effect upon vegetation as drouth and the protection against cold is found upon examination to be really a protection against drying. At the approach of winter, thin-bladed leaves are cut off, and in some cases, as the herbaceous perennials, the branches, also. In these latter, the life of the plant retreats to the stem underground, while in trees and shrubs, the living cells are safely packed beneath the bark or in the center of buds whose thick scales are often lined with

down and varnished on the outside. Such plants as retain their leaves have a thick epidermis or grow in places where they receive protection from surrounding objects. The rosette habit in plants like the mullein and thistle secure some protection from dead vegetation and fallen leaves, and from the covering of snow. We commonly think of the annual plants as dead, during winter, but they have simply retreated into their hibernacula which we are familiar with as a seed. Here snugly protected by the hard seed-coat, they await the spring. In regions subject to long drouths many of the forms of protection here mentioned are common and show clearly the similarity between cold and drouth.

VEGETATIVE REPRODUCTION.—A correspondent, recalling the curious growths in the axils of the tiger-lily leaves, asks for an account of the ways in which lilies reproduce vegetatively. The subject is large enough to form an entire chapter in botanical text, but some of the most interesting features may be touched upon here and no better illustrations of them could be found than in the lily alliance. At the beginning it may be said that most forms of vegetative multiplication are simply modified or transformed branches. One of the simplest forms is found in the Solomon's-seal where two kinds of branches are produced. One goes up annually from the rootstock to the light and air while others spread about in the soil until finally the decay of the older parts make them separate plants. In the trillium we find the rootstock shortened into a corm. In the corms of crocus or gladiolus there are no real branches, but in the places from which branches should grow we find bud-like objects called cormels. Since a bud is simply an undeveloped branch, we see these cormels are really other forms of branches. Proceeding to bulbs the whole underground part is very bud-like, but in the axils of the scales we find smaller buds or bulblets which readily grow into new

plants. The round bodies in the axils of the lily leaves above ground have the same relative position as the bulblets below ground and in fact are really a second form of bulb—or transformed branch or bud just as you please. In certain lilies we have even better evidence that these objects are transformed branches, for in these the bulbs are not formed in the axils of the leaves but instead a branch occurs there which after growing some distance forms a bud or bulb at the tip. The adder's-tongue often sends out half a dozen such branches from a single bulb and thus one bulb becomes several by the end of a year. If these branches should be slender and their tips be inordinately stocked with food, we should have a tuber, such as other plants often produce. Here again we see the small differences that separate one form from another. The house-leek, which sends out a branch above ground producing a tuft of leaves and ultimately a new plant at the tip, comes very near to producing a bulb above ground or, since it is thickened with food stores, we might, perhaps, call it a tuber. In certain onions, also, may be seen another bulb above ground where such bulbs may occur among the flowers or the whole flower-cluster may be turned to bulbs. It is well known that the flower, itself, is a greatly modified branch, and the bulblets thus produced go to prove it.

Plants and Freezing.—The living parts of plants consist of very minute box-like structures called cells lined with a clear watery substance like the white of an egg, called protoplasm. This protoplasm is the real living part of the plant and in some species is very susceptible to cold and dies as soon as the temperature approaches the freezing point. Many tropical plants belong to this class. In other plants, notably the perennials of cold regions, mere cold, unless extreme, does not kill the protoplasm, though sudden freezing and thawing may do so. The reason for this is found in the fact that in

gradual freezing the water in the protoplasm is drawn out through the cell wall and forms minute ice crystals between the cells in the intercellular spaces. When thawing begins, the water is again absorbed by the protoplasm and the plant is unharmed. Freezing is thus seen to have the same effect upon the protoplasm as drying. If the frozen plant is suddenly thawed the protoplasm is often unable to take up the water rapidly enough for its purposes and so dies. Similarly the sudden freezing of the plant may cause the ice crystals to form within the cell and possibly kill it by rupturing the cell-wall and its protoplasmic lining. With this explanation it is easy to see the sense in the gradual thawing out recommended for house plants that have been frozen, and also for the practice of plunging such plants into cold water or sprinkling them with it.

ROSELLE.—In the hunt for food, man has been guided only by his palate and has secured additions to his diet from any part of the plant kingdom or any part of the plant that may be of use. Fruits and seeds may be considered the only parts of the plant that were manifestly designed to be used as food, but man eats the food stored in the roots of the carrot and the like, that stored in the stem of the potato and artichoke, that in the leaves of onion and cabbage, that in the leaf-stalk or petiole of rhubarb and celery, that in the flowers of cauliflower and various tropical plants and even the pollen of some plants is made into bread. There are few plants, however, in which the calyx alone forms the edible portion, but this is true of the Jamaican sorrel or roselle (*Hibiscus sabdariffa*) which our government is trying to introduce into cultivation in the warmer parts of our country. As may be seen by the generic name the new plant is related to the hollyhock, cotton, okra and marsh mallow, but it is unlike in having an enlarged and intensely sour calyx. This is recommended as excellent for jelly-

making the product in color and flavor being quite similar to the jelly made from cranberries. It is also much used for jam. We in the Northern States will doubtless find the familiar cranberry quite good enough but in warmer regions the demand for roselle may continue to increase. The plant requires a long season for ripening and is very sensitive to frost. The name roselle is supposed to come through the French *oseille* which is the equivalent to the English "sorrel."

Food of the Field Mouse.—Man is not the only animal who takes thought for the morrow in the matter of food. All the hibernating animals that do not go into a complete and uninterrupted sleep, usually lay up sufficient food to serve them in their waking intervals. We are familiar with this habit in the chipmunk, but his activity is quite over-shadowed by that of his lesser relatives, the moles and field mice. The most provident of this tribe is doubtless the economic vole (*Microtus oeconomus*) who commonly lays by twenty or thirty pounds of fresh roots. The need for this great hoard is apparent for this species lives in Eastern Siberia. It is said that the Kamchatkans regularly rob these store-houses and look upon the vole with great favor, in consequence. A relative in Northern America, the tundra vole (*M. operarius*) also stores various bulbous roots, often placing a peck in a single cavity just below the surface of some mossy slope. This species is systematically robbed by the Eskimo women and children who search out the stores by means of sharpened sticks. Coming nearer home the common meadow-mouse (*M. Pennsylvanicus*) looks after the harvest and stores various foods. He seems to have a fondness for the roots of wild morning glory (*Convovulvus sepium*). A recent government bulletin shows a photograph of a pile of these roots weighing 18 ounces stored by a single pair of mice.

EDITORIAL

Some time ago, a contributor to this magazine submitted an article with the request that if not available, the editor would indicate the kind of articles that would be so. Possibly there are others among our readers interested in the editor's opinion of a readable article, and while it would be impossible to give directions by which anyone could write a good article on any subject, we purpose here to indicate a few of the fundamental rules. There is only one kind of an article that will be accepted by an editor without regard to the way it is written and that is the one that makes a direct contribution to science. There are not a few scientists who by reason of having articles of the kind accepted, have imagined themselves to be accomplished writers until they have tried to sell an article designed for a more popular audience. To interest such an audience one must be more than a scientist; he must be a good story-teller as well.

* * *

That part of the public that has an interest in plants, much prefers a thrilling tale of the marvellous things reputed to abound in the unexplored regions of distant lands to the plain uncolored statements of the scientist about his favorites. The real botanists of this country have before them the task of educating the people away from the untruthful statements of "newspaper science," and up to a proper appreciation of the beauty and wonder in even our common species. To do this we must mix the things that take hold on life with our science. Abstract science has no charms for the novice. "What is it good for?" is likely to be his first question, and "will anybody buy it?" follows close after.

* * *

The beginner who would like to see his writings in print will do well to select the nearest plant that interests him and

write of its interesting features in the best language he can command. It is worse than useless to consult a botanical manual while writing. Just because you happen to be interested in the flowers of a plant or its methods of seed-dispersal is no excuse for burdening your readers with a detailed botanical description of its leaves and roots. Consult the manuals if you must after your article is written, but while writing, better lock up the books. It is astonishing how the points of interest multiply when one stops to consider what it is in even some common plant that attracts him. Sometimes it is the peculiar situation chosen for growth, or the relation it sustains to surrounding plants; again it is its methods of obtaining its share of sunlight or its adaptations for pollination or seed-dispersal. Even the time of blooming, the shape and color of the flowers, the size of the seeds, the shape of the leaves, the texture of the bark, the form of the stem or the adaptations to environment may form the nucleus for a good story. The main thing is, have something interesting to write about, write it and then stop. Take the material nearest at hand, study your specimen carefully, forget that there is such a thing as a botanical description and you may be sure the editor will ask for more articles like it.

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The American Association for the Advancement of Science will hold its mid-winter meeting at Chicago, this year, during the week beginning Dec. 30. The meetings of the botanical section are always worth attending as the very latest things in botany are likely to be discussed. The meetings, which will be held at the University of Chicago, are open to the public and all who are interested in botany are invited to attend. At the time the Association meets many other national societies will meet in Chicago, notably the Botanical Society of America, the American Society of Naturalists, American Society of Zoologists, etc. At this time it is also proposed to form a Nature-Study Society.

BOOKS AND WRITERS.

The old problem of making the structure and life processes of plants intelligible has been attacked in a new way by Prof. W. C. Stevens in his "Plant Anatomy." The author says it is not nature's way to evolve cells and tissues at random with no problems to be solved by their evolution, and that the parts of a plant represents the means by which these organisms have triumphed over the conditions and forces which make up their environments. The book points out how these tissues have been evolved beginning with the plant cell and following with chapters on the differentiation of the tissues the plant skeleton, the absorption of water and gases, the construction of plant food, the circulation of food and water through the plant, the storage of these materials and secretion and excretion. At the close of each chapter are given directions for various studies to illustrate the topics touched upon in the text. Numerous illustrations and original diagrams add to the value of the text which of itself is a lucid presentation of the subject. The last hundred pages of the book are devoted to the micro-technic of plants. Here will be found chapters on the use of the microscope, section cutting, staining, reagents and the micro-chemistry of plant products. In these chapters the alphabetical arrangement of the items greatly facilitates reference to them. The book is an octavo of 340 pages and is issued by P. Blakiston's Son & Co., Philadelphia, at $2.00 net.

The American Botanist

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WILLARD N. CLUTE EDITOR

SPECIAL NOTICE.—This magazine is issued in two half-yearly volumes of five numbers each. Subscriptions $1.00 a year. All subsriptions must begin with a volume. To avoid the loss of numbers to regular subscribers, the magazine is sent until we are notified to discontinue and all arrearage paid. No one receives the magazine free except by special arrangement.

SAMPLE COPIES.—One cannot always judge of a magazine by a single number. Those who receive extra copies are asked to give them a careful examination. We know when a plant lover becomes familiar with the contents of this magazine he invariably becomes a subscriber. A single number may often be worth more than is charged for a year's subscription. The full set is almost a necessity to the plant student.

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THE NODDING ONION.
Allium cernuum.

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CONCERNING THE ALLIUMS.

BY WILLARD N. CLUTE.

IN the *Allium* or onion family, use and beauty go hand in hand. The leek (*Allium porrum*) the onion (*A. Cepa*) the garlic (*A. sativum*) and the chives (*A. schoenoprasum*) have been cultivated in the garden for the sake of their edible bulbs or tops from time immemorial, while many other species though inedible, or at least, not especially desirable from a culinary standpoint, have found an honored place in the flower garden because of their beautiful blossoms. Not all the edible species are cultivated, nor have all those with beautiful flowers been welcomed to our beds and borders. It is often a mere matter of taste—whether of man or plant not easy to determine—and like other matters of taste, bound by no set rules.

In Eastern America the native leek is *Allium tricoccum*. It is a plant quite different in appearance from ordinary *Alliums* with broad flat leaves instead of the more usual rounded hollow ones. In flowering, too, it behaves unlike most plants for its blossoms are not put up until all traces of the leaves have disappeared. In midsummer, or later, one may find these strangely belated flower-clusters blooming in the haunts of the spring flowers. It may be said in passing that the bulb of this species is sweet and toothsome and a fine addition to a lunch in the woods. The odor, however, is strong and penetrating.

Our commonest wild species is *Allium canadense* which is most abundant along brooks, in moist meadows and in open woodlands. Its bulbs are also edible, but smaller than those of

A. tricoccum and more strongly scented. Like several of the garden onions, it has the peculiarity of bearing numerous small bulbs in its flower clusters. These bulbs are really transformed flowers, just as the flower itself is a transformed branch.

The nodding garlic (*Allium cernuum*) is easily the queen of our native species and well worth a place in any flower garden. It delights in moist meadows and springy banks growing in dense colonies, which put up a perfect cloud of blossoms. The flowers, on slender pedicels, are borne in dense umbels at the top of a common flower-stalk which at the summit turns abruptly downward and gives occasion for the specific name. In color they range from pure white to deep pink, the pure white being the rarest. It may be possible that there are two forms of the white ones, one due to variations from the pink type, the other a pure albino. The flowers furnish much honey to the bees and are quite fragrant, but picked for a bouquet have the allium odor too well developed to be desirable. In their native haunts, however, they are among the finest of summer flowers and make the meadows gay with color. Our illustration will give an idea of the appearance of the species when in flower.

A TRIP TO MT. EQUINOX.

ON a perfect day in early June we set out, in the early morning hours, for a fifteen mile drive to Mt. Equinox; having in mind a botanical exploration of a part of this interesting mountain, by approaching it from the western side. Mt. Equinox, one of the highest peaks of southern Vermont, lies in the Taconic—a secondary range of the Green Mountains. Its height as given in the U. S. Geological Survey is 3816 feet. On the western side it is approached by several ranges of hills which gradually rise higher as they approach the main peak. This is quite in contrast to the eastern side which is

precipitous in many places and at once falls away to the broad valley of the Battenkill.

Leaving our horse at a farm house near the foot of the mountain, we decided to climb to the main peak by the most northern of the hollows as they were set down on the map, which one of our party had thoughtfully provided. This hollow proved to be a glen in which there must have been at times quite a respectable stream, when the melting snows of the upper mountain were the source of its supply. At this season of the year, however, it was shrunk to a small brook which was sometimes all but lost under the roots of trees or projecting ledges of rock.

At the entrance of this glen or hollow we found some interesting mosses among which were *Blinda acuta* and *Eucalypta streptocarpa.* Among these mosses we also found the algae, *Trentophylla aurea.* The farther up the glen we went the steeper became the climb, until we were forced to pull ourselves up by shrubs and the branches of overhanging trees. We still kept to the bed of the rivulet which here came tumbling down in a succession of small waterfalls. The rocks in the bed of the little stream were covered with that water-loving scale moss, *Scapania undulata* which was probably the variety *purpurea* of Gray's Manual as it showed the purplish leaves to a marked degree. Here was also the rare mountain moss *Gymnostomum rupestre.* Among other mosses noted on our way up the mountain were, *Dicranum flagellare, Hypnum engyrium* and *Myurella Careyana.* Of scale mosses we found *Frullania Asagrayana* and *Reboulia* (*Asterella*) *hemisphaerica* as well as two of the *Cephalozias,* namely *C. bicuspidata* and *C. multiflora.*

At the head of the glen we came out upon a shoulder of the mountain and here we were impressed by the sudden change in the flora. The transition to the sub-alpine forms was very marked. A little way below, the trees were in full

leaf but here were only about bursting the bud. The forest floor was densely carpeted with club moss, mainly *Lycopodium lucidulum,* and showed that the snow banks had not long departed.

As we neared the top the trees became smaller and were mostly spruce and balsam fir with which were intermingled some mountain ash and a few birches. From the top a magnificent panorama is spread out at one's feet, looking toward the East and the main ridge of the Green Mountains, but toward the West the nearer hills and mountains interrupt the view. While on top we made some examination of the lichen flora and were rewarded by finding on the rocks *Evernia furfuracea* and *Cladonia,* on the branches and twigs of the balsam, *Cetraria glauca,* and on the trunk of a mountain ash, *Nephroma laevigatum,* while a bit farther down we had found on a dead log, *Cladonia fimbriata coniocraea.* Of the more common lichens, particularly those inhabiting trees, there seemed to be a great abundance.

Afeter spending an hour or so at what appeared to be the stopping place for picnic parties, judging from the number of names scratched upon the slate rocks, we proceeded slowly along the main ridge about a mile to a point which we concluded to be at least 50 feet higher than the highest point marked on the map. This part of the mountain is densely clothed with a second growth of spruce and balsam. While in these woods we heard the clear, high note of the white-throated sparrow, but aside from this we marked little evidence of bird life about the peak. Perhaps, however, the hour—about noon—was unfavorable for their performances.

Coming down the mountain we followed another hollow than the one by which we had ascended. Here we found on the ledges of a cliff the tufted club rush (*Scirpus caespitosus*) and farther on near the foot of the mountain we chanced upon a fern that we had had in mind all day, namely, Braun's holly

fern, (*Dryopteris Braunii*). We were not fortunate enough to find either the wall rue spleenwort (*Asplenium Ruta-muraria*) or the purple stemmed cliff brake (*Pellaca atropurpurea*) although both are reported from the mountain, probably from the cliffs of the eastern side.

The late afternoon found us on our homeward route by another road which led down Green River, a small clear stream draining the western slopes. This stream enters the Battenkill which here breaks through the Taconic range. Along this fine valley we pursued our way and night found us at home well laden with the botanical spoils of Mt. Equinox.

Shusan, N. Y.

POD AND BERRY.

BY DR. W. W. BAILEY.

IT goes without saying that the fruit of a plant is often as beautiful as its flower. The dandelion, beloved of poets, the pet of children, is surely the glory of the spring, when its golden disks light up the meadow and the way-side with stars of the first magnitude. But when Nature, in a happy moment conceived the so-called clock, she exceeded even her usual standards of beauty. The evanescence of this ephemereal globe of down appeals in some subtle way to our affections. It seems a fairy creation, too light and delicate to exist on earth. Every thing about it is so fragile, so perfect, that we are surprised when a mere puff of wind destroys the integrity of the creation and wafts its tiny parachute on its aerial voyage.

As the season advances, fruit becomes more and more evident in the scene. Berries are now every where a prominent feature in the landscape. Along the highways the wild cherries hang their jeweled clusters, or the barberry presents it's coral beads. In the woods we notice the ivory white bane-berries or white cohosh, far more lovely than the ante-

cedent flowers. These berries are borne in a cluster on deep red pedicels which enlarge with the fruit. Another species with us not so common, has red berries, very brilliant and showy. The blue cohosh has "deeply, darkly, beautifully blue" seeds, exposed without pod of any kind, and hence unusual. They have a peculiar glaucous appearance. A more exquisite blue berry is that of the fine liliaceous plant, the Northern Clintonia, found in cold, deep woods, where the glossy green leaves in patches, remind one of the lily-of-the-valley. In spring it bears pretty yellowish-green lily-bells.

Jack-in-the-pulpit presents us a vermilion cluster, very rich and ornamental. So does the dwarf cornel or bunch-berry. The big Solomon's-seal has bluish berries, while the *Maianthemum* and *Smilacinas,* known as false Solomon's-seals, have red or mottled ones. The snow-berry (*Chiogenes*) is white and spotted like some bird's eggs; many cornels are white or blue, and the range of the latter color is extended by the many species of *Viburnum,* yet, in this genus, we have also the magnificent red clusters of the hobble-bush or way-farer's tree, a glorious shrub at all times.

Every one knows the red fruit of the hawthorn, and the brilliant "hips" of wild rose. Then, most showy of all berries, as autumn approaches, are those of black-alder (*Ilex vertillata*). As one sees from the botanical name, this is a holly and not an alder. The berries are familiar in Christmas decoration. In some parts of New England, the prickly leaved holly (*Ilex opaca*) is also common, and similarly used. It varies much in its productivity from year to year.

The twin berries of the fly-honeysuckle, seen in mountain woods, have a peculiar quality of opaque red. Very charming in the forest are the vermilion berries of the little *Mitchella* or partridge-berry, following one of the very loveliest and most fragrant of our wild flowers. The whole habit of the

plant is graceful, and it may be easily grown even in the house, by means of a Wardian case.

But leaving many berries unmentioned, we must consider some of the pods. These usually attract more by their grace of form than by any inherent color. The other day we found the giant St. John's-wort (*Hypernicum ascyrum*) four feet high and with great pyramidal capsules. Around there were still traces of the calyx and persistent petals. It is a grand plant when in bloom.

We never pass the great, fat, saucy pods of iris without desiring to pick them. The pods of evening primrose, too, are interesting, and the big prickly ones of "Jimson-weed" (*Datura stromonium*) most exquisite. It is interesting to note the kinds of dehiscence (opening) of pods. Some split through the back of the cells, others by the partitions, still others by chinks or pores, and not a few have a means to scatter the seed mechanically.

Providence, R. I.

ENGLISH TREES IN AUTUMN.

THE colors of our English trees in autumn make, on the whole, a much less vivid and conspicuous display than is to be seen during October and early November among the forests of Canada and the United States. The English climate has a hatred of extremes which seems to stamp itself on the foliage matured by its woods. Beautiful and brilliant as is often the beech in its scarlet and orange, or the crimson column of the bird berry at the copses edge, there is felt to be something more deeply and truly in sympathy with English scenery about the deep mouldering russet of the November oak-crowns—a color which no brightness of the autumn sunshine can quite kindle into living flame though it glows on steadfastly and strongly long after the more fugitive glories of the beech have been stripped by the late October gales.

There are no scarlets in the English woods so unfailingly brilliant as those of the American oaks, nor any yellows so profuse and constant as the Canadian maples. Even when transplanted to our own more temperate skies, these oaks and maples remain true to acquired habit and get a splash of color in the midst of the trees of park and garden which shine out amidst its surroundings like the glow of an October field-fire in a windy nightfall. Yet the primitive appetite for pure color which every man, more or less consciously, possesses could hardly require a fuller satisfaction that it can find in English woodlands and along English hedge-rows, when the right moment is chosen in autumn's gradual decline and the sun shines in limpid October brilliance through an atmosphere washed clear by rain.

When on a day of autumn wildness the dark shade beneath a tall avenue of close-set elms is thick with flying gold or all the scarlet and orange of a quiet bank of hillside beeches is whipped and flung abroad by the lash of Atlantic rain, there is a strange sense of the prodigal wastfulness in Nature, and of a spirit of destruction that seems wholly opposed to the slow maturing patience that is characteristic of her rule. To see the leaves of spring and summer that were nursed to birth and to full verdue at such pains of sunshine and fostering shower, now stripped and wasted abroad in the passion of a single hour, is almost like witnessing the sack of some imperial city by barbarians of the north. The wilderness of such an hour brings a kind of intoxication to the blood. Yet in reality the fall of the autumn leaf, whether it comes tumultously in the gale of a single night, or is completed gradually and slowly in calm and equable decay is no mere blind aberration of destructive violence but simply one stage in the continual progress of life. The leaves of the old year fall because the young buds of the new spring are already thrusting them from their places. In the case of many kinds of trees,

the new buds can be plainly seen as soon as they are disembarrassed of the old; but it is true of all that they thrust the old ones away by the development of their own more vigorous life and that the storms of autumn are no more than their auxiliaries. The failing of the leaf, in spite of all its accessories of ruin and decay is the first event of spring.

The more deeply the life of the English season is studied the more plainly it is seen that there is no dead low-water mark between one year and the next. In spring and summer, the tide may seem, indeed, to be strongly rising and in autumn and winter to ebb, but the forces of growth and decay are always at work side by side. Long before the hazel covers of April are breaking into leaf the snowdrops among their mossy roots have already passed their own time of flowering and have sunk once more into rest. It is the leafing of the beeches and ashes in the bluebell woods that cuts off the vivifying sunlight from the rich flower carpet beneath their boughs and thus ends spring for the flowers at the time the leaves aloft first feel it. So in like manner the visible decay of autumn is underlain on all sides by processes of reconstruction and growth.—*London Times.*

AROMATIC LIVERWORTS.—Fragrance in plants is of very wide occurrence. The mints are especially noted for this quality but many other flowering plants possess it. Among the ferns a large number possess fragrance as may be inferred from the number of specific names indicating this quality. Plants lower in the scale of life than the ferns are seldom fragrant. An exception to this is found in a not uncommon liverwort, *Conocephalum conicum,* whose bruised fronds have a strong odor which has been likened to bergamot or turpentine according to the person making the comparison.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

THE FOOD OF ANTS.—Notwithstanding Solomon's tribute to the industriousness of the ant, the life of such insects is doubtless not without its pleasures. The nectar of plants affords them a food to their liking, and the pollen and spores of the lower plants must be to them much as apples and oranges are to us. A writer in the *Bryologist* notes that they are very fond of certain moss spores and will gnaw a hole in the capsule in order to obtain them. *Webera sessilis* is reported to have been attacked in this way.

DIRECTION OF GROWTH IN ROOTS.—When a seed begins to sprout, the young root is first to come out of the seed-coats and this immediately starts downward in response to gravity. The direction taken by the first root is of great service to the plant for it thus soon encounters the much needed moisture. The secondary roots, however, are less influenced by gravity and the fine rootlets not at all. Gravity is thus seen to be not so much an impelling force as it is a force by means of which the roots direct their course. Other instances are not wanting in which roots seem able to choose between forces. Thus in the ceriman (*Monstera deliciosa*) which climbs on tropical trees, some of the roots grow at right angles to the stem and hold it in position while others grow straight downward to secure food materials. In our common poison ivy, which pro-

duces roots along the stem, the directing force is light, for no matter where the roots appear they immediately grow toward the darkness. In this way they are surest of finding something to lay hold of. In the chokeberry and some other shrubs, some roots after traveling under ground for some distance turn upward and produce shoots at their tips. Roots that are ordinarily influenced by gravity will also turn aside for moisture if the pull of gravity would take them into dry soil. It thus appears, that the root, lacking even the rudiments of a nervous system, can yet perceive various forces and use or leave them as the necessity warrants.

Keeping Cut Flowers Fresh.—No greater amount of misinformation in the same space can be found in the ordinary newspaper than that which offers directions for keeping cut flowers fresh. Among the things recommended are putting the ends of the stems in boiling water, putting charcoal, soda, ammonia and other substances in the water in which the flowers are placed. The truth of the matter is simply this: flowers, like animals, are constantly transpiring moisture; a wilted flower has lost so much moisture that its cells are no longer filled and therefore cannot hold the parts in position; the moisture to replenish the cells comes upward from the roots through the stem. The way to keep flowers fresh, then, is to surround it with the conditions that will assist it to retain its moisture and to get more. Warmth promotes evaporation and cold retards it; therefore avoid placing the flowers in direct sunlight or in a very warm room. Dry air also favors evaporation and flowers should be kept in a moist air, if possible. If not, spraying the foliage is of value. Since leaves also transpire, do not allow too many to remain on the stems. In many plants there is a considerable tension within the stems and when they are cut or broken this tension allows the air to rush in and fill up the tubes through which the water travels. Before placing your flowers in the vase cut off a few inches of

the stems *under water.* Remove flowers as they fade, give plenty of clear water, changed daily and conform to the other conditions mentioned and your flowers will outlast any that have been scalded or dosed. Finally, it should be remembered that all flowers have a natural period of bloom and will not stay open longer under any treatment. Therefore select young flowers.

SASSAFRAS AND OTHER TEAS.—We were a little amused by the statement in a recent number, that sassafras tea was used during the Civil War by the people of the South. So it was, but it was used from choice and a taste long cultivated. Long before the war, both whites and Indians made sassafras tea during the spring when the sap of the sugar maples was running. They boiled the sap awhile then added the sassafras roots and boiled them a while longer and the tea was finished and a drink fit for the gods was the result. Was this fact alone not the cause of drinking sassafras tea in the spring of the year? The most common substitute for tea during the war was the leaves of *Ilex opaca.* It makes a very good tea.—*Dr. E. L. Lee, Bridgeport, Ala.*

THE BOULDER FERN AND WATER.—Most ferns are so adjusted to moisture and shade that they soon wither when gathered for decorations, but the boulder fern (*Dicksonia pilosiuscula*) which delights in sunny hillside pastures is not one of the number. Although at first glance its finely dissected and delicate fronds would seem but poorly adapted to withstand drying, it will be found upon experiment that no ferns in our flora are better able to do so. The thick-skinned polypody and the Christmas fern are no match for it. At present florists make great use of the spinulose wood fern (*Nephrodium spinulosum*) for bouquets, but this fern wilts very rapidly. They could apparently gain much by changing to the boulder fern, which has beauty, fragrance, abundance and lasting qualities to recommend it.—*Fern Bulletin.*

ORCHID NOTES.—Mr. J. H. Massey, Bolton, Conn., writes as follows: "Does the whorled pagonia (*Pogonia verticillata*) bloom at periods widely separated? In 1902 a friend found it growing in a small wood-lot, literally by hundreds. We have watched it every year since for a month or six weeks around the time of blooming (middle of May, onward) and while we can find plenty of plants we have thus far found only four blossoms; one in 1903 and three in 1907. Why is it that most of our common orchids, no matter how long left in water, do not discolor or taint the water? Have tried the following: pink lady's slipper, ragged fringed orchid, purple fringed orchid, calopogon, adder's mouth or rose pogonia, and arethusa. Until the flowers fade the water remains clear and with no more odor than when they were first put in. I tried coral root but that tainted the water. In speaking of the small white lady's-slipper W. H. Gibson says in "Our Native Orchids": "It is the only other white *Cypripedium* besides *C. reginae,*" but one small boy used to bring to school pure white lady's slippers which to all appearances except color were identified with the common pink one. [With reference to the whorled pogonia it may be said that while some orchids, like the purple fringed orchid and lady's tresses, seldom fail to flower at the appointed time, there are others, including pogonia, that appear to flower only when the mood strikes them. The editor has known of a colony in the Susquehanna Valley, that so far as he could discover, flowered only once in ten years. On the other hand, near Southampton, Long Island, he found a colony in which nearly every plant was producing flowers. The green fringed orchid not only does not flower every year, but has been reputed to rest in the ground during some summers without even putting forth leaves. It may not be generally known that pogonia is a half-parasite, stealing from other plants by means of its roots. Perhaps the kind of host adopted may influence the flowering. The cause of the fouling of water in

which plants are placed is due to various bacteria which begin to tear down the tissues of the plant. If the orchids do not suffer this, it is probable there is something in their tissues that prevent bacteria from developing. Further investigations are desirable. The white lady's-slipper was without doubt an albino pink one. Those who discover albino flowers of any kind ought to remove them to their grounds for futher study. —Ed.]

The Cactus and Cold.—Because the various species of cactus are most plentiful in arid deserts, it is often assumed that they cannot endure the cold. Many kinds, it is true, are adapted to warmer regions and are killed by freezing temperature, but one species of prickly pear, at least, *Opuntia Rafinesquii,* grows along the Peace River, a tributary of the Mackenzie in latitude 56° and is here exposed to temperatures of more than fifty degrees below zero.

Violet Seeds.—It takes a long time to be certain about anything in botany. It used to be asserted, and is yet, in some quarters, that the showy or petaliferous flowers of violets always failed to produce seeds. So long as this was believed it formed an excellent background for picturing the necessity for cleistogamous flowers in this group. But now that it turns out that nearly all the showy flowers can and do produce seeds the reason for cleistogenes will have to be sought elsewhere. It will probably be found in climate, as the writer of this long ago suggested. Dr. Ezra Brainerd recently examined eighteen species of "stemless" violets and found that all but two produce seed freely from petaliferous flowers. Some plants produced more than three hundred seeds. Dr. Brainerd says: "The structure of the flower, in style, stamens and petals, shows a most ingenious arrangement to prevent self-pollination; and it was evident that the ovules are readily fertilized by the pollen of an allied species. The co-existence of this

habit with the opposite habit of producing, in summer, self-fertilized flowers, is apparently the cause of the multiplicity of forms in this group of plants. Hybridism gives rise to numerous intergradient types; cleistogamy preserves them from further intermixture."

SPORE DISPERSAL IN SPHAGNUM.—In the *Bryologist* for November E. J. Winslow notes that the spores of the peat moss (*Sphagnum*) are scattered by little explosions that are sufficiently loud to be heard and sound "like the snapping of a wheat straw." The explosions seem to be due to the drying out of the moisture in the capsule where exposed to sunshine. The spores were projected upward in a reddish-brown cloud for two or three inches.

MUTATING RUDBECKIAS.—At the recent meeting of the American Association for the Advencement of Science, Dr. W. J. Beal of the Michigan Agricultural College, showed two sheets of *Rudbeckia hirta* heads that exhibited most maked departures from the normal. They ranged from heads with eight rays to others with thirty-two. There were two heads with quilled rays, one of which was quilled nearly to the tips of the rays, the other less so. One had a green center instead of the usual purplish brown disk which, as Dr. Beal remarked, should be called green-eyed Susan if anything. Others has broad rays, still others narrow rays, and there were also examples of heads with drooping rays. Two or three specimens with purplish markings at the base of the rays, similar to those reported from time to time by other observers were also exhibited. All these forms were found wild but only after an examination of thousands of specimens. Without doubt they will reproduce themselves and even show improvement under cultivation. It is entirely probable that what Dr. Beal has accomplished with these species can be duplicated with others. All it needs is a similar amount of patience and perseverance.

Such instances show us very clearly that nature is constantly varying and possibly producing forms by mutation. These are not species but they are no less worthy of study.

A Moss Used for Decorations.—A writer in *Bryologist* notes that a common American moss (*Climacium Americanum*) is frequently used by English florists for wreaths and crosses, the stems being tied in bunches with pleasing effect. A dealer is authority for the statement that the moss comes to the market in a dried condition under the name of resurrection moss. It is usually dyed various colors before using.

Books and Paper.—It is interesting to note how some of the most important words in the English language have been derived from plants. The present age would not be of much account without books and libraries, but it devolved upon plants to give not only the first books to the world, but the name for the places in which they are kept and the keeper. To begin with, the inner bark of trees is called *liber* and because the ancients wrote on such bark the name was transferred to the books thus made. It was then an easy step to library and librarian. The word *libel* is also derived from liber. It was first simply *libellus* and meant a little book or as we would say a booklet or pamphlet. But the tendency of pamphleteers to say things of an uncomplimentary nature, because so marked that libel soon took on the meaning we now commonly give it. Paper is derived from *papyrus* a latin word for a certain water plant from which the ancient Egyptians made writing material. The stem which is about an inch in diameter, contains a soft pith, that being cut in thin slices and arranged in several layers at right angles to one another and then pressed makes a serviceable paper. When other substances took the place of papyrus the product was still called paper and doubtless always will be.

Lygodium as a Decoration.—The Japanese climbing fern (*Lygodium Japonicum*) unlike many other ferns grows with unusual luxuriance in cultivation and some florists are beginning to use its fronds in place of smilax in decorations. It has been found that the fruited pinnae remain fresh as long or longer than the sprigs of smilax and are no more difficult to grow.—*Fern Bulletin.*

Loco-Weed Poison.—The owners of all kinds of live stock in the West and Southwest annually lose many animals through a disease called loco, which is reputed to be due to their feeding on various plants of the pea family known as loco-weeds. In some single States the losses often run up to a million dollars annually. From 50%to 75% of a flock of sheep or herd of cattle may become locoed to the great loss or even bankruptcy of the owner. According to C. Dwight Marsh, of the U. S. Bureau of Plant Industry, the investigations of the Government has shown that the idea that the loco disease is caused by plants is correct and two species of the Leguminosae, *Astragalus mollissimus* and *Aragalus Lambertii,* are named as the offenders. By feeding experiments these have been found to cause animals to become locoed. As further proof, the poison producing the disease has been extracted from the plants and found to loco other animals when administered to them. Remedial measures can now be adopted with some certainty of being effective.

Seed Study.—Anyone interested in the study of seeds will find much to interest him in the following items published in former numbers of this magazine. The figures after each title represent the volume and page, the number before the colon being that of the volume. A seed defined 3:47, Does Selaginella bear seeds? 3:48, Vitality of seeds 2:42, 6:55, 12:83, Vitality of tree seeds, 6:16, Vitality of weed seeds 1:89, Long lived seeds 9:76, Nature's seed testing 6:115, How some

seeds are planted 1:86, The study of seeds, 6:95, More about seeds 5:65, New work 5:111, Collecting seeds 5:47, Wildflowers from seeds 6:92, Naming plants from seeds 4:79, Seeds and light 10:36, Why seeds are kept cool and dry 6:116, Camphor for germinating seeds 7:15, The germination of seeds 2:77, Germination of American lotus 11:40, A seed problem 5:77, Relation of elevation to the shape of seeds 3:15, American lotus seeds 11:17, Job's tears 8:36, The tonka bean 8:34, Abrus precatorius 2:58, Seed-stalk of black acacia 12:84, Knowing beans 12:112, Gathering nuts 3:66, Some foreign nuts 12:3, The pistachio nut 12:39. Much additional information regarding seeds may be found in other articles in these volumes. Any volume will be sent for 50 cents, or for 40 cents if ordered with a year's subscription. For prices of full sets see advertising pages.

Glandular Plants.—The glands found in plants originate in many ways and function in as many more. The *Ohio Naturalist* for June prints a list of nearly two hundred Ohio plants that have glands on or in their leaves. Of these, by far the largest division is that with punctate leaves in which the glands are seen as minute dots, clear, yellow or black in color when the leaf is held up to the light. The St. Johnsworts (*Hypericum*) are good examples of this class. Another division represented by the bee-balm (*Monarda*) and the mints (*Mentha*) have glandular scales, while still another is characterized by glandular hairs and other emergencies. Of these the nettle (*Urtica*) is a good example of stinging hairs, but many plants with aromatic foliage are included, such as the walnut, several of the lady-slippers and some ferns. The glands in the interior of the leaves usually secrete volatile oils, but the glandular scales found on the stems and leaves of many plants secrete resins. The huckleberry (*Gaylusaccia resinosa*) may be mentioned as an example of the latter. It is not well under-

stood what uses many of these structures serve in the economy of plant life, though most of them doubtless aid in modifying the rate of transpiration.

INJURED SYCAMORES.—Mrs. Emma Buszek writes from Orange, California, in reference to recent notes in this magazine on the subject of diseased sycamores, that in California, where the native sycamore is *Platanus racemosa,* she has noted the leaves affected in a manner similar to that reported for the Eastern tree. There does not seem to have been any investigation made as to the cause of the trouble in the California plant, though it is certainly not due to frost.

DELAYED GERMINATION.—As common and well-known as seeds are, there are still many things about them that puzzles both the cultivator and the scientist. Some will grow as soon as ripe, a few will grow before fully ripe, while the great majority appear to insist upon a season of rest before they will consent to germinate. Usually the renewal of growth, or germination, occurs after a season of drouth or cold has passed, as in our climate the seeds are formed at the approach of winter and germinate when it has passed, but some seeds will not germinate even then and may exist for years in a perfectly dormant state before growth is resumed. In the case of land plants whose seeds behave in this way it has been found that delayed germination is occasioned by the seed coats being impervious to oxygen. Thus denied a sufficient amount of this gas the seeds refuse to grow. Breaking the seed coats to let in the air starts the embryos into growth at once. In water plants a similar condition exists, but Dr. William Crocker reports in the November *Botanical Gazette* that although immersed in water the reason these seeds do not germinate is because they lack not oxygen but sufficient water. Many of them may be kept in water for years without germinating, if care is taken to prevent fermentation. As

soon as the seed coats are ruptured so that plenty of water is available, the seeds grow immediately. Some seeds of water plants will not grow if kept moist, but if allowed to dry up and then moistened will readily germinate. This is supposed to be due to the cracking of the seed coats in drying which thus allows the moisture to enter the seed.

ORCHID SEEDS.—Most orchids produce immense numbers of seeds, but the seeds themselves are usually very minute. The embryo they contain are mere rudiments of a young plant and as is well known, germinate and grow with difficulty. The fact that so few plants result from a sowing of orchid seeds has suggested the possibility that many of the seeds contain no embryo and the immense number in a capsule give rise to the suspicion that many of the ovules are never fertilized or that possibly many of the seeds are produced parthenogenetically. A writer in the November *Botanical Gazette* asserts that in the examination of a large series of seeds from our native *Cypripediums* none were found without embryos. When we realize the immense numbers of pollen grains that are required to ensure that all the seeds in a capsule will be fertile, the orchid's reason for bearing its pollen grains in connected masses so that they may be transferred in a body is apparent.

FERTILIZERS AND CROPS.—For centuries man has known that he cannot successfully grow crops of the same kind in the same fields without heavy additions of fertilizer. The idea was that the crops removed from the soil certain elements in it, which had to be made good from the fertilizers. Since different crops take different substances from the field a "rotation of crops" was established by which each field produced a succession of different crops. Recent experiments, however, go to show that in most soils there are food materials enough for many crops of the same kind but that the reason plants can not make use of them is that the roots of each crop leaves

in the soil something which prevents the roots of similar plants from growing there. By the addition of fertilizers succeeding crops are able to rid themselves of these harmful substances and here is found the reason for fertilizing the land. A rotation of crops contributed to the same end by allowing time, between two crops of the same kind, for the harmful substances to disappear.

Acclimatization.—For every plant there is a certain maximum, minimum and optimum temperature which determines its life processes. These processes go on best at some point between the maximum and minimum temperatures called the optimum, but are active in lessened degree on both sides of the optimum until the minimum or cold limit or the maximum or heat limit is reached. Beyond these, the plant either dies or goes into a resting condition until the return of better conditions. The points at which heat and cold stop the activities of plants are often called the cardinal temperature points. Frequently a plant will have one set of cardinal points for growth and another for seed bearing. Acclimatization of a plant consists in removing it to a warmer or colder region and by cultivation or selection, raising or lowering its cardinal points to conform to that region. Since, as we have mentioned, plants may have different cardinal points for different functions we may acclimatize one and not the other. Many plants of warm regions when removed to colder ones will grow but are unable to lower their cardinal points for fruiting and thus do not flower or make seeds. On the other hand, arctic plants will often grow luxuriantly in warmer climates, but fail to fruit. Only those plants that are capable of raising or lowering their cardinal points to a great extent are able to make any great north and south extension of their range.

EDITORIAL

Slowly but surely the modern conception of what constitutes a species is taking definite form. In a general way mankind always has had a fairly good conception of species in theory, but this did not always work in practice. The idea has been expressed by saying that a species is a group of individuals that resemble one another more than they do any other group, but trouble always arises when anyone attempts to draw the line between groups. If the resemblance is limited to the flowers, all the members of the sunflower tribe might be considered to form a single species; if it is extended to the leaves and other parts of the plant, we find numerous species; if it is extended to the minute parts, pubescence, veining, shape of the rays, cutting of the leaves and the like—the species will be endless. Before the time of Linnaeus, the conception of species had hardly reached our first supposition; in his day, and later, the second idea held sway and it was not until comparatively recent times that much was made of the lesser variations of plants. With the consideration of these lesser forms, however, began the tendency to narrow the limits of species until of late a species may mean something entirely unlike what it did in the time of Linnaeus or even Darwin. It is due to the increasing exactness of botany and the close examination that is now given to critical plants, that these small variations are known to exist and the great question now is, are they, or are they not, good and distinct species?

* * *

The symposium on the "Aspects of the Species Question" held by the Botanical Society of America at the recent Chicago meeting was, in our opinion, one of the most important of contributions to this subject that has been made in many years.

Six well known botanists gave the leading papers, Dr. Charles E. Bessey and Dr. N. L. Britton speaking on the taxonomic aspect, Dr. J. C. Arthur and Dr. D. T. MacDougal on the physiological aspect, and Dr. Frederick E. Clements and Dr. H. C. Cowles on the ecologic aspect. The eminence of the speakers in their respective fields and the care with which the papers had evidently been prepared, gave unusual weight to the opinions expressed. Contrary to what might ordinarily be expected from men who look at the question from such widely differing viewpoints, there was remarkable unanimity in the conclusions drawn. The work of De Vries and others in recent years has made it impossible to ignore a host of forms less than species in the ordinary sense, and the presence of these for a time bid fair to still further complicate the species question, but fortunately for science they are now being regarded as additional aids toward defining a species. Dr. Bessey fairly expressed the sentiment of the symposium in his statement that nature produces individuals and not species, and that a species is a mental concept and nothing more. The excuse for the species concept at all is that it saves labor by allowing us to think in terms of the group rather than in terms of the individual. Excessive multiplication of species, therefore, is to be deplored as a great number of species defeat the very end for which the species concept was originated. Dr. Bessey holds that all plants should be included in as small a number of species as possible, and that species-makers should look for resemblances in plants instead of differences. Descriptions of species should be brief enough to be easily remembered, and a species that cannot be identified by its diagnosis or description has no right to exist. Dr. Britton made a surprisingly conservative address detailing early conceptions of species, recognizing the lesser forms of today and suggesting that the latter be treated as elementary species, races, forms, varieties, sub-species, or possibly numbered vari-

eties. In discussing the physiological aspect it was pointed out that many changes in form can now be produced by variations in the food, or by chemical and other means and it appears quite possible that many forms whose origin we do not know, may have been produced by such means. Emphasis was laid on the fact that many of these elementary species may be cultivated and their differences studied and proved experimentally. The ecologists pointed out that the forms of plants are largely due to their surroundings, and that a species cannot be rightly estimated in the herbarium, but must be studied afield. Dr. Cowles called attention to the fact that if we call all these small forms, species, we have got so far away from the Linnaean conception of species that it is unfair to longer date the beginning of our nomenclature from 1753. In conclusion, if the expressions of these gentlemen fairly represent present day opinions in regard to taxonomy, the pendulum has begun to swing away from species-splitting to a broader conception of species. Conservative botanists, among whom the editor of this magazine desires to be numbered, may therefore be congratulated upon this rather complete though tardy justification of the opinions they have so steadfastly held, and look forward to a period of stability as regards species while varieties and forms increase apace.

* * *

The receipt of a copy of the second edition of Dr. W. W. Bailey's "Botanizing" is a pleasant reminder that the good old practice of botanizing has not quite gone out of fashion. Some years have elapsed since the first edition appeared but the continued demand for the book made a new issue necessary. This is apparently printed from the same plates as the first edition, and thus is not quite up to date in a few minor particulars, but it is the only book of its kind and is no doubt destined to have the long season of popularity that its excellence deserves.

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CONTENTS

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ACROSTICHUM ALATUM.

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THE GENUS ACROSTICHUM.

BY WILLARD N. CLUTE.

WHEN Thoreau wrote that nature "made ferns for pure leaves, to show what she could do in that line" it is evident that he did not have a typical *Acrostichum* in mind for of all plants, the majority of this group are least like the conventional idea of a fern. Beginners in the study may occasionally press the leaves of yarrow, tansy and other plants with much divided leaves under the impression that they are ferns, but they rarely discover that the *Acrostichums* are such until they have made considerable progress in naming the ferns. More than two-thirds of the hundred and fifty species belonging to this group have simple entire leaves that are more like the leaves of plantain and dock than anything else.

The author quoted, however, was nearer right than appears on the surface for nothing could better illustrate nature's versatility than this fact that she has made a hundred different species in a single genus by merely modifying the outline of a simple leaf. In some species the leaves are broad, in others narrow, some are long and others short, some rounded at the apex and others pointed. The bases may be wedge-shaped or rounded, or heart-shaped and the surfaces may be scaly or smooth. By combining these various characters in different groups the varied forms have resulted.

Many botanists are inclined to put all these simple fronded ferns in a genus by themselves and to assert that no species with divided fronds should be included in it, but the method of fruiting seems to bind together both the species with simple fronds and those in which the fronds are divided.

In the method of fruiting, too, this group is peculiar. In ordinary ferns the spore cases are to be found on the under side of the leaves in tiny groups of various shapes, but *Acrostichum* seems dominated by the principle that what is worth doing at all is worth doing well and when it sets out to fruit, it spreads the entire under surface of the spore-bearing fronds with spore-cases, while in a few species a finishing touch is put on the job by the addition of a coating of spores on the upper side of the frond as well, a trick that other families of ferns do not seem to know. Spore-bearing is serious business with *Acrostichum* and in some of the species with finely divided fronds, the fronds which bear the spores are made broad, and entire so that there shall be plenty of room for the spore-cases.

A similar method of bearing spores is found in the staghorn ferns (*Platycerium*) of the green houses and faint traces of it are seen in such genera as *Gymnogramma* and *Lomaria* which is regarded as an indication that all these genera are rather closely related.

The habitat and habit of the plants are as varied as their other characteristics. Some live on the earth in exposed places, others may be found on the branches of trees and others, unable to find a perch on the branches, send their stems straight up the trunks to a considerable height or creep among the mosses on old logs. Those that live on trees are among the most interesting since their fronds are decorated with soft brown scales that are often so abundant as to conceal the green tissues below. In others the scales are restricted to a delicate fringe on the margin of the fronds. Those that live in the soil usually do not have these scales, from which it is apparent that the scales are useful to the epiphytic species in aiding the fronds to retain their moisture.

The smaller *Acrostichums* are not more than two or three inches high, and the species with simple leaves rarely have fronds more than two feet long, but some of the other mem-

bers of the group may be eight feet high, as is the case in one species belonging to our own fern flora—*Acrostichum lomarioides.* The *Acrostichums* are essentially a tropical group but in their region are abundant both as to individuals and species. Only two species reach the United States—in Southern Florida —but are not uncommon. The species we have chosen for illustration is a form of the widely distributed *Acrostichum conforme* which is found in nearly every part of the world where *Acrostichums* occur. The varied forms are often regarded as distinct species, and the one here illustrated is usually called *Acrostichum alatum.*

ENCHANTER'S NIGHTSHADE.

BY MISS EMMA E. LAUGHLIN.

SOME plants attract by means of their showy blossoms, some by their fragrance, and others by some unusual form; but there are plants which, like some people, can be appreciated only when well known. They are like Wordsworth's

"Violet by a mossy stone,
Half hidden from the eye,"

and do not become interesting until the observer stops, notices closely what might otherwise be lightly passed by, and so learns intimately the life story of a charming personality—a new plant.

Among these unassuming plants is *Circaea Lutetiana* or enchanter's nightshade. It is a rather common plant of moist woods and may be found blooming from June to September. It was supposed to have been used by Circe in her enchantments so Linnaeus named it *Circaea,* and added *Lutetiana* from Lutetia, the name of an ancient Gallic city which was located on the present site of the city of Paris.

Circaea is a member of the Evening Primrose Family. When it first appears in the early spring as a cluster of fresh,

thrifty, green leaves, a cursory glance will asign it to the Violet Family. The leaves then are ovate in form, slightly dentate, and somewhat rounded at the base. Later, a stem grows up out of this rosette of leaves, and its leaves are of the pronounced *Circaca* type, keeping the same general form, but becoming acuminate and having the veining quite distinct. These leaves are slender-petioled and opposite. From the axils of the upper leaves a few branches grow, and these, together with the main stem, terminate in racemes of small white or pinkish flowers.

The peculiar characteristic of this plant is the number two which appears in every part of its flower as well as in the arrangement of its leaves. There are two sepals, two petals, two stamens, and two pistils which are united into a two-celled ovary containing two ovules. To preserve this symmetry the petals are obcordate, sometimes appearing to be bifid. While the flowers are too inconspicuous to be called pretty, yet there is a certain daintiness about the wand-like recemes which is attractive.

The fruit is obovoid in shape, much resembling a club in miniature, and is densely covered with stiff hooked hairs or bristles. When mature each fruit is deflexed at an angle of about forty-five degrees. These burs often adhere to clothing or to animals and so are carried far from their place of growth. *Circaea* may be reproduced from these seeds but a surer method is by means of underground runners.

By the first of August it will be found that each plant has sent out perhaps as many as a dozen slender creeping rootstocks, white in color, and often more than a foot long. These form a network just beneath the surface of the ground, or a part of their length may be upon the surface, but the buds at the ends will always be found under the ground. After frost has destroyed the parent plant these white rootstocks become separated from it and lie dormant until spring when the leaves

appear again and a new cycle of existence is begun. Sometimes the stems becomes swollen at the joints or nodes and take on a red color which adds to the attractiveness of the plant. When this occurs the flowers also are tinged with red, or rather pink. Another *Circaea* found in colder woods is *Circaea alpina*. This is a smaller variety and is less common.

Barnesville, O.

A TRUE MARCH FLOWER.

BY DR. W. W. BAILEY.

THE first real flower of the year as that term is popularly understood, is, in Southern New England, the whitlow-grass, or *Draba verna* of science.

It is a member of the large and very natural family known as cresses, or mustards. The alliance, owing to its well-marked characters was recognized by Theophrastus, Dioscorides and other early botanists,.

These characters are, in the flower, a calyx of four distinct, erect sepals, a corolla of four spreading petals, with stalks or claws, as a rule alternating with the sapals; and six stamens, of which four are longer than the other two. This goes to show that so apparently trivial a factor as number and length may play an essential part in classification. Still more distinctive is the peculiar pistil, consisting of two carpels (pistil-leaves), and hence structurally one-celled, but in fact, becoming two-celled by a false partition caused by an extension of the thin placentae into a separating membrane. This is what makes the silvery shining portion so characteristic of the garden plant called honesty.

The peculiar ovary may be compared to a parlor, separated by folding doors, into two compartments. As on the walls of said parlor pictures are hung, so in this cell are suspended the ovules or young seeds. In certain Californian plants of the

family, the folding doors, so to say, are only half drawn or, to speak accurately, the placentae fail to unite across the cell. It is always delightful to discover these gradations, confirming a philosophical theory worked out antecedent to their finding.

Plants of this family,while commonly herbaceous,as is the case with all eastern ones, may sometimes, as in the mustards here, or *Thelypodium* in the far West, attain a height of 12 or more feet. In some parts of the world, indeed they are woody. The common cabbage, in one of its forms, as cultivated in the channel Islands off the coast of France, grows into a well-marked little tree. So various are the habits and appearance of different kinds of cabbage, broccoli, Brussels sprouts, Kohl-rabi, and cauliflower, that one viewmg them without antecedent knowledge, would certainly never guess their origin.

The curious Rose-of-Jericho, prevalent on the plains of Syria, is one of this order, and is famous for its peculiar manner of drying up into a ball, made of the incurved, fruit-bearing branches. In this condition it is widely blown about over the country, till reaching a moist and favorite spot, the branches unfold and scatter the seeds. Hence its name, in common with several other unrelated things, of the resurrection plant. A club moss of the Far West, for instance, is sometimes sold on our streets as the true rose-of-Jericho, an unpardonable misnomer for a species of *Selaginella*.

A characteristic of all cresses, which indeed, endows them with their name *Cruciferae,* is the cruciform corolla. This is produced by the four petals, so displayed as to appear, when looked down upon from above, as a well-marked cross often Maltese in pattern.

The order has an interest also from the fact that its members are, without exception, harmless and, indeed, anti-scorbutic, i e, preventives of scurvy. Often has their discovery proved the salvation of an infected ship. They are, however,

in this regard no longer so important as formerly, for the canned vegetable industry serves to counteract the excessive use of salt provender, the cause of the disease.

Our tiny *Draba*, in common with nearly all weeds found in the eastern United States, is adventive from Europe. This reminds one of a story told of Sir Joseph Hooker when on the Arctic Expedition with the Erebus and Terror. It is said that Sir Joseph's ship stopped for one night off the South Shetland Islands, as remote and inhospitable as almost any place on earth, and he, desiring to ascertain in a general way, what grew in such a spot, asked some sailors who were bound ashore, to pluck any plants which, in the darkness, they might encounter. They returned, much to his amusement and chagrin, with a tuft of shepherd's-purse—one of this family—which grows in every English lane.

Draba verna, owing to its small size—it is only a few inches in height, and owing also, to its thin, wiry stems and rosette of small radical spatulate leaves, is very inconspicuous. Its flowers are white and, as they are almost immediately go to seed, it requires a sharp eye to reveal them.

The pods of *Draba verna* are ellipsoid but later, a native species, *Draba Caroliniana* has long, narrow capsules. All the species of the genus are classed as frequently "alpine," which means, not that they are confined to the Swiss Alps, as people are apt to interpret them, but are distinctive of high mountains the world over, near the snow line. Such mountain forms are very pretty, often with yellow flowers. They may easily be transplanted and made available for rock-work.

Providence, R. I.

DOES THE BOTANIZER NEED A MICROSCOPE?

BY A. E. WARREN.

IS a compound miscroscope worth its cost to an amateur botanist? Not being an oracle my only way of tackling the problem is by the light of limited personal experience. Of course everybody knows the miscroscope must be used in studying the lower crytogams and in general plant histology, but this talk is to the ordinary botanizer who confines his attention to pickable posies. Let us hypothetically classify a plant in which the essential floral organs are barely discernible to the eye. The lazy way to analyze (?) in an obscure case is to look for its picture (!) But illustrated popular books don't bother with inconspicuous flowers; they deal with the more showy blossoms. Consequently whether we are lazy or industrious we must depend on our own abilities.

Now we all know how very hard it is to be absolutely accurate in our early observations under such conditions. It is so very easy to 'guess'—but guessing is an unpardonable scientific sin. The use of a hand magnifier helps us along to some extent. The same magnifier mounted over a dissecting stand having hand-rests at the side is another step in the right direction. With these facilities a surprising amount of detail may be made out by a patient observer. But again a limit is reached. With important structural details still just beyond our powers of discernment the danger of guess-work is again at hand.

Suppose we now have access to a low power compound microscope. The tiny ovules suddenly enlarge into marvelous little translucent globes filled with changing lights. Details of placentae are no longer obscure. Pollen grains are little pearls covered with intricate tracing of dainty design. Growing pollen tubes may be seen pushing on their wonderful way.

Heretofore unnoticed hairs at the base of the stamens are living things through whose transparent cellulose walls mystery laden protoplasm is seen streaming along its complex currents.

Dos this sort of thing pay—these occasional glimpses into some tiny corner of old Mother Earth's illimitable store? The compound microscope is the only entrance gate. Diagrams and book-talk don't admit one into the inner circle.

As for pay—well it pays some people. It will not pay one who never has time to look at a sunset, nor gives note to rainbow colors in a drop of dew, nor listens to the old robin singing in the elm tree across the road. It depends on whether the particular amateur botanist we are 'advising' is in touch with the tranquil beauty which underlies all this great pulsating world of matter and energy or whether

"The primrose by the river's brim
A yellow primrose [is] to him
And nothing more."

Ada, Ohio.

THE PRICKLY PEAR.

AT the mention of the word cactus, our thoughts instinctively travel to those dry and arid wastes where the conditions of growth are so rigorous that few plants, save the thickest skinned and most stolid can hold their ground. It is something of a surprise, then, to be told that cacti are found in many places where a more luxuriant flora prevails. Several species are found on the plains as far north as the Dakotas and Minnesota, and one strays into Manitoba. In the Atlantic States, one species, the common "prickly pear" (*Opuntia vulgaris*) reaches the northeastern limits of its range in Massachusetts and is fairly common in the vicinity of New York city.

Like all cacti it loves the sun but accepts winter's cold with composure, and true to its instincts, selects the most exposed

places for its home. It may frequently be found basking in the sun on the crests of the exposed rocks, rooting in soil so thin that it is a perennial wonder how it lives at all. In such rock situations it seems scarcely in keeping with the scene. No matter how often it is passed its unusual form seldom becomes completely blended with the other vegetation. But in the "sand barrens" of Long Island and New Jersey it gives the finishing touches to the picture of barrenness, sprawling over the hot sand in places where nothing else will grow.

Many of those who chance to find this plant, take the flat joints of the stem for leaves. The real leaves are seldom noticed. They are thin narrow, scale-like structures that appear of little use to the plant and soon fall away. From their axils are commonly produced small spines or bristles which protect the plant from grazing animals. All the functions of leaves are performed by the stems.

The cactus understands how to reduce living to its simplest terms. It is as if it had withdrawn both leaves and branches inside its trunk, resolved to take everything serenely. In the place of bark, the stem is covered with a thick epidermis that is slow to part with the moisture entrusted to it, let the sun shine as hot, or the wind blow as cold, as it will. It lives slowly, like a toad.

The flowers appear in June from the edges of the flat stems. They are among the handsomest blooms that the barrens produce, being yellow in color, with numerous petals and stamens like other cactus flowers, but with considerable resemblance to the water lily. No two flowers, however, could be further apart in disposition and habits. They divide fire and water between them and each is supreme in its own element. For the lily, water; for the cactus, sand and sun. In similar fashion they divide the hours, the lily's day ends as the prickly pear's begins.

The flowers are succeeded by dull red, pear-shaped fruits

about an inch long that stand erect on the smaller end and make the plant almost as conspicuous as the blossoms do. They are ripe in late October. The prickly pears that come to the autumn markets are the products of a southern species, but our native prickly pear is very like the other, except in size and is also edible. It can scarcely be called palatable. There is a certain wildness of flavor about it, however, which those who welcome new experiences from Nature will always be glad to taste.—*From an article in New York Tribune.*

FLOWERS IN HIDING.

THE ancients told of a flower, the asphodel, which bloomed only in the sunless meadows of the underworld. Moderns long ago set the story down as a bit of poetic fancy, but the myth really has a counterpart in fact—so hard is it for the imagination to transcend entirely the realm of the real. I found this out one day in late spring when I plucked up a purple violet by its roots, and lo! radiating horizontally from the base were a number of subterranean blanched stalks tipped with tiny pink and purplish buds which had been buried with the roots in the earth. These are true flowers, producing abundant seed underground, but are without petals, fragrance, or nectar. Any one may see for himself these gnomes of flowers by examining the bases of blue violet plants in late May or June. In some species of violets the secret flowers are borne not on the horizontal creepers, but on upright stalks, and such flowers are not buried, though in other respects they are similar to the underground kind.

There are others of our wild plants less common than the violet that produce subterranean blossoms. One of these is the polygala or milkwort, a small herb frequent in sandy soil, which may attract us by its pretty spike of purple flowers that give never a hint of the underground runners tipped with plain-

er bloom. Another is its cousin the fringed polygala or flowering wintergreen, one of the most charming of all our wild blossoms; and I have found also in the pine barren region of our Atlantic coast a grass that mingles earth-born flowers with its roots.

In all these cases the underground flowers are quite small and never develop petals, but they are more prolific in the production of seed than the showy ones of the upper world. Imprisoned in the dark, hidden away from the diversions of a sunlight life, they have nothing to do but devote themselves strictly to the business of seed making; their capacity for beauty has been checked in the bud, and from infancy they have been disciples of the practical life while other flowers are leading a debonair, open-air existence, entertaining the bees and dispensing fragrance and beauty to every passer-by. So have we seen the Gradgrinds of business shut themselves in their dingy counting-houses with no thought but to turn their energy into dollars; while other men are wholesomely helping their neighbors, enjoying God's blessed sunshine, and taking their families upon a holiday now and then.

But flowers have other ways of hiding than burrowing in the ground. The fig tree, for instance, has such a secretive method of flowering that people who have lived within the shade of one all their lives, will sometimes contend that it never blooms. As a matter of fact the branches bear every year tens of thousands of blossoms, not one of which is ever seen by the human eye. They are borne on the inner walls of hollow, jug-like receptacles, which just before the leaves expand in the spring, push out upon the young twigs. In this darkling chamber, into which the sunlight never penetrates, the tiny florets packed side by side in a sociable company, mature and produce their seeds. The snug little house grows rapidly and gathering juiciness as it grows, becomes the delicious fig that we all like.

Less completely hidden than the fig's blossoms, but still concealed from all but the most prying visitors, are the flowers of many plants of the arum tribe—the family to which the Jack-in-the-pulpit, dear to every childish heart, belongs. Here the homely little flowers nestle about the base of a spike which is inclosed within the arching "pulpit," and are entirely shut off from public view. The skunk cabbage, earliest of all our wild bloomers, belongs to the same tribe, and hides its floral children even more effectively. In late winter, before its rank leaves have unfurled, this plant sets upon the still frozen marsh a mottled, purplish cradle, not unlike a conch shell in shape, within whose twilight depths blooms a small ball of flowers, spreading a breakfast of pollen for winged insects that marvelously find them in their hiding-places.—*C. F. Saunders in Young People.*

Birds as Botanists.—We have several times noted in this magazine instances in which birds of prey have been known to decorate their nests with various fresh plants, and further notes on this point are given in a recent number of *Science.* Branches of green laurel have been found in the nest of the golden eagle and when these were taken away: others were brought to replace them. The osprey is reported to carry fresh seaweed to its nest and the herring gull adds grass and various other green materials to its nest. Freshly-cut sprays of hemlock have been found in the nest of the red-tailed hawk. The collecting of these materials is regarded as due to a "recrudescence of the building instinct" and it is said that no significance attaches to the fact that the materials gathered are fresh and green. It may be pointed out, however, that when the birds are really nest-building they rarely, if ever, collect flowers and leafy things for the work.

NOTE AND COMMENT

Wanted.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

Injured Sycamores.—In the 18th Report of the Missouri Botanical Garden Hermann Von Schrenk reports that in Missouri and various other parts of the country the young leaves of the sycamore were killed by the severe frosts in the spring of 1907. While it is not to be doubted that sycamore leaves may occasionally be killed by frost, yet the fact remains that some sort of fungus attacks the young leaves making it a difficult matter, at first glance, to decide whether the injury was caused by frost or fungus.

Plant Distribution.—Every species inhabits the areas which it has been able to reach and occupy from the starting point of its place of origin. Neither its birth-place nor any of the places within its range may offer the most suitable conditions for the best growth and highest development. Beyond seas, over mountain ranges, across the equator or past other equally effective barriers, may lie plains, valleys, plateaus and even continents, where if once introduced it might overbear all competition from the plants already there, extending its distribution a million-fold. Let the barriers be once passed and it enters into a new kingdom as the various invasions of weeds amply testify. The soil, the various factors of climate, the course of the seasons and the actual composition of the plant

covering already present in the region, may be such that the intruder becomes an integral part of the flora and it may indeed perish in its original habitat and in the places successively occupied by it, leaving us no clew as to its place of origin. —*D. T. MacDougal, in Plant World.*

LAW AND THE BARBERRY.—Plant students of the present day are familiar with the fact that the wheat rust, which does great damage to various grains, ordinarily begins its existence by producing cup-like fruiting parts, called aecedia, upon the leaves of the barberry. By means of spores borne in the aecidia it is able to spread rapidly to the grain later in the season. Long before the real nature of the wheat rust was discovered, observant farmers had noted the connection between the barbarry and rusted grain and as early as 1755 the then Province of Massachusetts passed "An Act to Prevent Damage to English Grain Arising from Barberry Bushes" which fixed a penalty of a two-shilling fine for every bush left standing after a certain date.

DESERT FLOWERS.—A desert is popularly regarded as a vast stretch of sandy sterile soil upon which no rain falls and in which, therefore, plants cannot grow. A more accurate definition of a desert would be, a region in which rain falls at such long intervals during part of the year that most plants cannot maintain a continuous vegetative existence. Certain plants like the cactus and agave or century plant, store up water during rains for use in drouths and are thus considered true Xerophytes, but many thin-leaved annuals have learned the habits of the dessert and thrive even in such inhospitable regions. At certain seasons of the year, especially immediately after the rainy season, plants spring up as if by magic and carpet the waste with flowers. In many places there are so many plants that they crowd one another. A count of

some regions has shown more than a hundred seedlings to the square inch. All these desert annuals are noticeable for the rapidity with which they develop. This is doubtless due to the fact that they are the descendants of a long line of plants which have time and again had it forced upon them that they must ripen their seeds before the precious moisture in the soil has disappeared. The seeds, too, seem to understand something of this, and in years when, for one cause or another, the rains are scanty, they do not grow at all but lie in the soil until another year of greater rainfall.

HYBRIDS AND VARIATIONS.—The prominence given these subjects at present makes the following list of titles of articles published in this magazine of interest. The number preceding the colon indicates the volume and the other the page. Hybridizing plants 6:111, violet hybrids 7:117, 12:11, wild hybrids 12:16, Hybrid lobelias 5:101, Asplenium ebenoides a hybrid 3:51, crossing orchid genera 5:37. The citrange, tangelo and plumcot, 5:119, variation in pecan, 2:57, variation in round leaves orchid 7:55, variation in plants 3:48, variation in common polypody 5:55, elementary species 8:97, making new species 10:17. Making a new variety 9:73. Possibilities of species-making 11:21, the interpretation of species 10:117. The American hop trees 11:43, more extinct species 3:52, 9:15. Species of varieties 4:74, origin of species by mutation 3:26, new species of plants 7:111. Cinamon fern fruiting in Autumn 2:44. Two forms of Virginia creeper 3:35. Formation of leaves in water 3:35. Varying size of Jack-in-the-pulpit 9:73, Variation in toad flax 12:43. A large Arisaema 11:40. A large head of sunflower 11:88. Single volumes may be had for 50 cents each or for 40 cents when ordered with a year's subscription. The numbers are not sold singly. See advertising pages for complete sets and other numbers for different lists of titles.

THE TALIPOT PALM.—The talipot *Corypha umbraculifera*) is one of the most beautiful of palms with a tall mast-like trunk sometimes reaching a height of over a hundred feet. The great semi-circular, fan-like leaves are often as much as fifteen feet in radius giving a surface of about 350 square feet. The natives claim that the talipot can be used for one hundred and one purposes, the principal ones being as a rain coat and a sun shade. When a talipot palm reaches maturity its leaves decrease in size and finally a gigantic but nearly four feet in height is developed. This bud bursts open with a report and an immense inflorescence unfolds itself, appearing like a pyramid of cream-colored flowers rising to a height of 20 feet or more above the leafy crown. Innumerable nuts follow in due course and their appearance is a sign that the tree is nearing its end. It gradually begins to droop, the leaves wither and in less than a year it falls dead.—*Plant World.*

PLANT PHYLA.—Most people are familiar with the fact that the genus is not the highest group in classification. Beyond the genus is the family which includes many genera as the genus includes many species, and beyond the family is the order containing numerous families. Beyond the order is the sub-class, beyond this the class, and at the top of the list the Phylum. The phylum is the name given to the great groups of the plant world. By many these have been considered to be only four in number, namely, the Thallophyta or algae and fungi, the Bryophyta or mosses and liverworts, the Pteridophyta or ferns and fern allies and the Spermatophyta or flowering plants and conifers. In a recent publication entitled "A Synopsis of Plant Phyla" Prof. Charles E. Bessey has rearranged the phyla and their lesser divisions and now recognizes 12 Phyla, 34 classes, numerous orders and 636 families. The largest number of families is found in the Anthophyta or flowering plants which contain 280 and the next

largest is the Carpomyceteae of fungi with 145. Each family, order, sub-class, class and phylum are briefly described and show more clearly than usual the relationship of the plant world.

VITALITY OF PLANTS—The vitality of many plants seems largely a matter of moisture. A plant that cannot endure frost, and which, of course, would be killed by a heat many degrees below the boiling point of water, can cut off its seeds, each of which contains a plant like its parent, and after these are thoroughly dried, they may be subjected to heat above the boiling point or exposed to the greatest degree of cold that can be produced and escape unharmed. Give these seeds water, however, and they act exactly like the parent plant in their relations to heat and cold. The change in the seed, which enables it to endure extremes of heat and cold, while due largely to lack of water, is also due to other causes, for the protoplasm becomes harder, more granulose and denser, and changes somewhat in chemical composition.

THE FLOWERS OF THE HOP.—The hop (*Humulus lupulus*) is one of the plants known as dioecious, that is it produces pistillate (female) flowers on one plant, and staminate (male) flowers on another. Some recent observations by W. W. Stockberger have shown that the power to produce stamens is latent in the case of the female plant and flowers containing both pistils and stamens have been seen. A second observation bearing on the same phenomenon is that the underground runners which produce new plants may give rise to plants that are of the opposite sex from the plants which produce the runners. The question of the origin of dioecious flowers has yet much of mystery about it. In all probability the flowers of different sexes have been formed by the dropping out of one set of essential organs in each, but how this has been of ad-

vantage in the evolution of such species is still problematical. The whole willow and poplar alliance have dioecious flowers and might form good subjects for experiment along this line. The power to produce the structures lacking in each type of flower is doubtless latent in each plant if one could discover the conditions necessary to bring it out.

Function of Stomata.—In all the higher plants the leaves are covered with a thin skin or epidermis that is nearly impervious to water and air, but since the vital processes of the leaf cannot go on without access to the surrounding air, the epidermis is provided with millions of small openings called stomata. These consist of two, usually crescent-shaped, cells which are currently supposed to open and close as the needs of the plant require. In dry air they were expected to close and thus retain the moisture of the leaf, but in moist air they were supposed to open and allow transpiration. Every book on botany makes this statement but like so many other things in botany that have been taken for granted, it is now known to be incorrect. Whatever else the stomata do, they do not open and close in response to varying amounts of moisture in the air.

Seed Dispersal in Polygonum.—It is a common failing with scientists to over look any publication that does not make great pretentions to authority. In consequence many botanical facts that may be well known are again "discovered" by scientists who do not take the trouble to look up the literature of the subject. An instance of this came to notice recently in a publication by two botanists with the suggestive names of Reed and Smoot, in which the seed dispersal of the Virginian knot-weed (*Polygonum Virginianum*) is discussed. Essentially the conclusions they make were published in Kerner & Oliver's "Natural History of Plants" many years ago. In substance the principal method of dispersal is this. The fruit

stalk has a joint at the base which becomes very brittle as the fruit matures. The walls of the stalk are rather hard and rigid and the growth of the pith so compresses the cells in the interior that considerable tension is developed. At the slightest touch, therefore, the seeds are projected for some distance. The plant also has a second means of distributing its seeds for the slender bakd fruit is barbd and readily catches into the coat of any animal that brushes past it.

VIRESCENCE IN OXALIS.—The student on the watch for the curious in nature may occasionally find flowers in which some or all the parts have taken on the color, if not the character, of leaves. When the color and not the form is affected, is called virescence, but when the form also is affected the phenomenon is called frondescence. Several instances of frondescence have been recorded and illustrated in this magazine and the green rose and green carnation are familiar phrases of the same thing. The latest contribution to our knowledge of the subject is made by Henri Hus, who found at St. Louis a green flowered race of *Oxalis stricta* which he calls *viridivora.* In this the petals have taken on a deep green color, but are little altered otherwise except for being a trifle smaller and thicker. The plant sets seeds abundantly and th peculiarity of the flowers is transmitted to the seedlings.

HAWS AND HEDGES.—It is pleasant, occasionally, to speculate upon the derivation and meaning of the words connected with plants. Take the case of the word haw, which at present stands as the name of the thorn-tree's fruit (*Crataegus*). This is only a secondary definition, apparently, for the original haw meant an enclosed garden or yard and we may assume that these thorny trees, growing on the borders of the haw or garden would soon be called hawthorn if, indeed, they were not given this name because their well armed stems

were first used to fence in the haw. When haw is spelled haugh, however, it means a low-lying plain beside a river and haw-haw is the name given to a sunken fence, wall or ditch. In this last we see the name transferred from the ground surrounded by a wall to the wall itself and haggard which is allied to haw originally meant of the hedge or woods. Hedge and haw are in a sense synonymous, though there are some who would derive hedge from edge by the prefix of an h in the style of some of our English cousins, and point to the fact that we still speak of edgings for borders as a confirmation of their view of the matter.

Name of Carolina Poplar.—Considerable difference of opinion exists, as to whether or not the Carolina poplar is a distinct species. Prof. C. E. Bessey has been investigating the subject and his results are summed up in a reprint from the Report of the Nebraska State Board of Agriculture for 1906-7. The first use of the name, Carolina poplar, was made by Aiton in 1789 in connection with *Populus angulata*. This name has been used at intervals since by numerous authorities. Bailey's "Cyclopedia of Horticulture" calls the tree var. *Caroliniensis of Populus deltoides*. The specific name, *deltoides*, it may be remarked, is applied to the species better known as *Populus monilifera*. Prof. Bessey concludes that there are three common cottonwoods in the Eastern and Central States to be named as follows: Carolina poplar (*P. angulata*), Eastern poplar (*P. deltoides*), Western poplar (*P. occidentalis*). In connection with these we may mention the two native aspens, the large toothed (*P. grandidentata*) and the common (*P. tremuloides*) and the three poplars from the Old World commonly cultivated, namely, the white poplar (*P. alba*) the Norway poplar (*P. nigra*) and the Lombardy poplar (*P. dilatata*). To make our list complete several others might be added.

Ant Plants.—A few years ago, nothing seemed surer, in the stories of returned travellers and botanists, than the fact that certain species of tropical plants maintained body guards of stinging ants as a defense against leaf-eating animals and in return for their services fed and housed the entire regiment. Recent unsentimental students of this matter assert that the plants can get along without the ants quite as well as a dog can without fleas and thus all the "adaptations" which the plants were supposed to have evolved with reference to the ants must be translated in some other way. The ants, however, are said to be completely adapted to the plant and do not seem to prosper at all without them. If the plants derive any advantage from the presence of the ants this seems a mere incidental. In this connection it may be observed that we have an ant-plant in the Northern States in the form of the blazing star (*Liatris scariosa*). In old plants the center of the tuberous underground parts usually decays and almost invariably the cavity thus found is inhabited by a colony of ants. The presence of these ant colonies doubtless keep various creeping insects away from the plants, but the benefit is not apparent for other plants that lack a colony prosper in spite of it.

Weed Seeds.—In a general way we are familiar with the fact that every wild species maintains its existence only by a constant struggle, but we seldom fathom the depth of the struggle. A grass field, for instance, looks peaceful enough, but a moments reflection will convince that the plants in this particular field are here only because they are the survivors or rather victors of a thousand battles in which uncounted multitudes have gone to their deaths. These battles have possibly been waged most fiercely between plants of the same species, but there are other battles of species with species, of plant with insect of plant with cold and drouth and heat and food. The pistils of necessity must receive the precious pollen, and

the seeds produced must not only be strong and viable, but they must escape destruction by birds, mammals, insects and various elemental forces. A side-light upon this struggle is found in the statement in the *National Geographical Magazine* that the tree sparrows in a state lik Iowa eat up during the winter, no less than 875 tons of weed seeds. The tree sparrow is a small bird and eats for the most part minute seeds so that the number of seeds in the amount mentioned is almost inconceivable. The tree sparrow is only one of a number of seed-eating birds and thus we get some idea of the vast number of seeds that weeds must produce to merely hold their own in the world. Conversely we may see the inestimable value of the service the seed-eating birds render to agriculture.

SEEDS AND. LIGHT—New facts are constantly being brought to light that at first glance seems to indicate that plants have perceptions of no mean order. An illustration of this is found in the behavior of certain seeds with reference to light It is well known that plants require light for growth but seeds do not need light for germination, otherwise the farmer would have to plant all his seeds on the surface. Seeds of epiphytes, that is, plants that grow upon other plants, seem to realize that when they are in darkness they are not in a favorable position for growth and therefore refuse to germinate. In some experiments recently performed at the Missouri Botanical Garden, seeds of the strangling fig (*Ficus aurea*) planted in darkness refused to grow for more than 60 days, while seeds of the same plant grew in nine days when planted in the light. Except for difference in the light the seeds were treated the same.

EDITORIAL

Readers of this magazine will recall that upon several occasions the editor has tried to secure an associate editor in order to reduce the amount of routine work devolving upon him. When this magazine was started the editor had more leisure than at present to devote to it, but each year has seen an increased demand upon his time until it now becomes necessary to retrench somewhere in order to allow him time to eat and sleep. He has found by somewhat extended experiment that teaching botany all winter lecturing all summer, editing this magazine and the *Fern Bulletin* and writing an occasional book in between does not give that leisure which should go with the simple life.

* * *

The burdensome part of editing and managing a publication lies in the necessity for constant attention to advertiser, contributor, illustrator, cut-maker, compositor, proof-reader, pressman and paper-maker in order that all may work together to get each issue out on the proper date. It will be seen that reducing the *number* of issues greatly reduces the amount of routine work, and therefore, though we regret the necessity for the step, this magazine will be issued hereafter as a quarterly, with a corresponding reduction in price. We have no doubt that there will be considerable regret at the change—in fact several of our friends have written to say that they would be willing to pay more and have the magazine as it is—but we repeat that while the editor was never known to side-step a dollar coming his way, it is time, rather than money that he is after now. Lack of time alone, has caused the delay in the present issue.

* * *

The reduction in the number of issues of this magazine does not mean a corresponding reduction in the amount of

matter published, for we shall add *one-third more pages* to each issue. We shall also use a greater number of illustrations than heretofore and with the price reduced to 75 cents a year, every subscriber will get more for his money than ever. It is our intention to issue the magazine in February, May, August and November, and in this way the numbers for the entire year will appear in what is practically the growing season. Alternating with these numbers, the numbers of the *Fern Bulletin* will be isued and the two will form essentially one magazine with the two sections paged separately. Our readers should have them both. Both journals will be sent to exchanges of this magazine.

* * *

Although the subscription price will hereafter be 75 cents, a year, all subscriptions on our books that are paid for the present year have been extended for another half year, that is we have given a year and a half for each dollar paid in advance. As we do not wish to be partial in such matters we offer to give a year and a half for each dollar sent within the next thirty days. But in order to secure this rate the dollar must be sent in such form that we can get a dollar for it. Renewals through an agency at reduced prices will not count, nor will personal checks on small banks upon which we have to pay collection fees.

* * *

With a view to giving all an opportunity to take advantage of our dollar offer we have made all bills for subscriptions sent out with this number for a year and a half in advance. Subscribers who do not care to pay beyond the present year are not in any way obliged to do so. Those who do not receive bills will understand that their subscriptions are paid in advance for at least a year and a half.

* * *

Since this issue ends the monthly series, we shall soon make all back numbers up into volumes but before doing so

we make this last offer to complete files free. We want every subscriber to have clean and complete files. Look through your magazines at once, and if any copies are missing or soiled we will replace them free if notified at once. To subscribers, and to subscribers only, we offer any of the back volumes at exactly half price, namely 25 cents a volume. This offer is only made for 30 days and will not be renewed. The seventy-five numbers already issued contain more than 1500 pages and at the price they may now be obtained, if ordered at once, constitute the cheapest and best botanical literature obtainable.

* * *

The Post Office Department has recently decreed that publishers cannot legally carry unpaid subscriptions longer than four months, thus putting an end to our well-known custom of allowing subscribers to pay each year when they chose. Those, therefore, who wish to continue the magazine but do not care to pay at once should send us word to continue. Such notice for this and succeeding years may be given by simply saying on a postal once for all "continue until ordered stopped." Those who owe us for a year or more are now asked to pay up, since our only recourse in case they do not do so, is to send the bills to an agency for collection. We trust they will understand that such action is in no way a reflection upon their honesty, but necessitated by the action of the Post Office Department. Those who notify us to continue may pay each year when they please, as usual.

* * *

Much as we regret a change in the name of any plant, we specially deplore the tendency to "honor" present day botanists at the expense of those of another age. Instances of this are found in the substitution of *Porteranthus* for *Gillenia*, and of *Isoetes Brittoni* for *Isoetes Braunii*. The instances can be multiplied but the principle is the same in all. One of the most

recent and regrettable of these changes is the proposal to substitute *Sherwoodia* for *Shortia.* For more than fifty years the name *Shortia* has been known throughout the world for a famous group of plants but because an eccentric botanist named Rafinesque happened to use the name *Shortia* "in an obscure publication" two years before Torrey and Gray gave it to the present genus we are asked to make the change to *Sherwoodia.* It is to be hoped that Mr. Sherwood did not have anything to do with suggesting this change. There ought to be some way provided in the rules for him to decline so dubious an honor, but at present he is pilloried, whether he will or not. In these changes, too, the suggestion is always possible that they were made with an eye to personal advertisement rather than to the advancement of botany. In the present case it is noted that all the species of the genus *Shortia* are noticed sufficiently to entitle the one who dug up the old name to add his own name to the new combinations. So long, however, as botanists agree to write the name of the one who changes names after all the changes he makes, we may be sure that all possible changes will be made .

* * *

In a recent botanical work which follows the "American code" there are a few more instances of name making which should receive attention. The old family Compositae once included plants like the dandelions and the rag-weeds but these were taken out some years ago as two separate families. Now the remaining compositae are again split up into smaller families and we have Grindeliaceae, Gnaphaliaceae, Partheniaceae, Madiaceae, Heleniaceae, Anthemidaceae, Senecionaceae, Carduaceae and so on through the list of tribes. If asked what good, botanically comes from considering the various groups of composites to be separate families, we should have to confess that we do not know. We observe, however that several of these surprising creations have "fam. nov.,"

which stands for new family, immediately following them and suspect the separation of the groups, was not dictated entirely by disinterested motives. Those who are not too far away from school days may remember the struggle they had in studying decimals to get the decimal point in the right place. Removed one point to the right or left, every figure was exaggerated or diminished ten times. It seems to us that the trouble with many of our modern botanists is that they have got their botanical decimal point in the wrong place. Under such circumstances forms readily look like species, species like genera and genera like families. All plant groups are at present better defined than ever before, and the relation of one to another is practically unchanged. All we need to make a sane botany is to change our decimal point.

* * *

Those who are hesitating between the nomenclatures favored by the "American code" and the Vienna code respectively, are invited to consider the following facts. The Vienna code has been accepted by practically all the great centers of botanical activity in the world. We do not hear of a Japanese code, a Russian code, nor ought we to have heard anything about an "American code." Of all people, we who believe in the rule of the majority should be the last to get off in a corner by ourselves and make a new "code" when the voting goes against us. But suppose we do follow this new code, it will not affect world botany in the least except to make a lot of synonyms. The botanists on the other side of the pond will go on making their floras, and monographs according to the rules which everbody else has adopted, giving our species the names they deserve and compelling us, by sheer force of numbers and authority to agree with them. As soon as those who are most interested in foisting this spurious nomenclature upon us have passed away, the "American code" will meet the fate it deserves, and those who have followed it will regret the precious time wasted. The question is not how many American botanists at present can be found willing to support our provincial code, but what the final outcome of the movement will be. With practically all the rest of the world arrayed against us, the "American code" leads only to defeat and he who forsakes it now is wise.

THE AMERICAN BOTANIST

DEVOTED TO ECONOMIC
AND ECOLOGICAL BOTANY

EDITED BY WILLARD N. CLUTE

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CONTENTS

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CONTENTS

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A QUARTERLY DEVOTED TO ECOLOGICAL AND ECONOMIC BOTANY

WILLARD N. CLUTE EDITOR

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CALOPOGON—*Calopogon pulchellus.*

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"Give fools their gold and knaves their power;
Let fortune's bubbles rise and fall;
Who sows a field or trains a flower
Or plants a tree is more than all."

—*Whittier.*

SOME WILD ORCHIDS.

BY DR. W. W. BAILEY.

IT is a fact well known to flower-lovers that certain plants, abundant one year, may not be found again in the same place or anywhere else for several seasons, thereafter. In many cases these are found at times in such quantities that one cannot account for their lapse on the ground of injudicious plucking. The phenomenon has deeper and, to the writer, unknown causes. He does not propose, at this time, to theorize upon them nor to dogmatize—which is worse.

One of these so-called "meteoric" plants is a very queer orchid of the genus *Pogonia*. In appearance and habit it is wholly unlike its pretty sister, *Pogonia ophioglossoides,* which derives its specific name from the appearance of the leaf which is like that of the fern *Ophioglossum* or adder's tongue. The freak one of which I shall now speak is called *Pogonia verticillata* from its whorl or verticil of glossy parallel-vined leavse just beneath the flowers. The latter are in no way showy, but queer to a degree. They are of a dusky purple hue, supported on a stalk longer than the ovary. The sepals or outer floral envelopes are narrowly linear, more than twice the length of

the petals and spreading from a mostly erect base. The lip, that characteristic part of an orchid, has a narrow crest down the middle but is beardless. The flowers are generally solitary, or with (rarely) a pair to a stem.

Owing to its sombre colors, one is apt to overlook it in years when it is frequent. Some seasons, as we have seen, it fails, at others I have had it sent to me from six or eight widely scattered places in the State. It grows in low, dense woods, in clumps of several or many plants and is spoken of in Gray's Manual as "rather rare." As that author was accustomed to use the word, rare, that would usually mean hard to find, yet as I have said, here in Rhode Island it is in some years not at all uncommon.

The more familiar sweet-scented *Pogonia,* looks much like *Arethusa* but is more delicate in color, bears one single leaf near the middle of the stem and a smaller one near the terminal flower. The spoon-shaped lip is bearded, as the name *Pogonia* signifies and is also fringed. It blooms later than *Arethusa* and like it is most dainty and charming. It, from its beauty, runs some risk of destruction from ruthless picking. Unhappily it pulls up readily from the ground and we see it and *Arethusa* sold in large bouquets on our city streets.

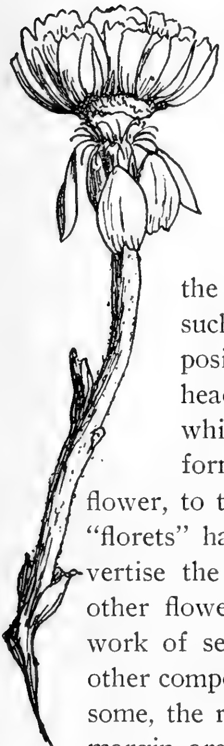
Another orchid, nearly related to these, and equally lovely is *Colopogon* meaning beautiful beard. It bears several magenta colored flowers on a stem, these much larger than in the plants before mentioned. Unlike most orchids it bears an erect lip. It is common in wet grounds throughout Rhode Island in midsummer.

Providence, R. I.

COMPASS PLANT FRUITS.

BY WILLARD N. CLUTE.

FEW people, save the scientists, are aware that the so-called flowers of the compositae are not really flowers but clusters of flowers. Popularly the bright colored objects that make up the bulk of the dandelion or aster "flower" are supposed to be petals, but they are more than petals. It only requires a moments examination with a lens to show that each "petal" is in reality a complete flower with calyx, corolla, stamens and pistil. The course of evolution is regarded as always running from simple to more complex forms, and just as in our own civilization co-operation is more effective than individual effort, so among the flowers, those which work together for the good of the whole community are considered higher in the scale of life than those which are independent of such assistance. Judged by these standards the Compositae are the highest types of plant life. Each flower head may be regarded as a co-operative community in which every flower has its own part to perform. Thus it comes about that in the sunflower, to take a well-known example, the outer flowers or "florets" have their corollas made larger and brighter to advertise the location of the flower-cluster to insects, while other flowers, nearer the center of the cluster, perform the work of seed production. Examining the flower-clusters of other composites we shall find many variations of the type. In some, the ray-flowers, as these brighter colored florets on the margin are called, are sterile, in others they may bear only stamens or only pistils, while still others bear both sorts of essential organs. Sometimes it is the disk-florets that produce the seeds, at others these are sterile and the rays are seed-bearing. This latter method prevails in the genus to which the



compass-plants or rosin-weeds (*Silphium*) belong, and it is made noticeable by the fact that as the seeds ripen, the remains of the disk florets fall away leaving the broad black fruits radiating from the disk like some new and strange composite flower. The most interesting feature of these strange objects, however, is to be noticed shortly after the seeds have matured. By this time the thick and fleshy involucral scales have dropped, the bark of the peduncle has loosened and the outer part of its central cylinder has separated into its component bundles each of which now turns outward bearing a fruit at its apex. Although the composite nature of the flower-cluster is perfectly familiar to botanists, it is seldom that nature so clearly indicates it. In the case of the compass-plants the likeness to the closely related Umbelliferae is particularly striking.

SELECTING A MICROSCOPE.

BY A. E. WARREN.

TO the amateur naturalist blessed with a purse of average length the acquirement of a compound microscope is a subject fraught with many scare crow dollar-marks. Tending against the popularity of the instrument to an even greater degree is the belief that its actual use bristles, cactus-like, with technical difficulties. There is just enough truth in each of these notions to keep this noble instrument out of the hands of the great majority of home scientists who work *con amore* and have only a limited supply of money to spend on hobby-riding. That neither idea is wholly true the writer affirms on the strength of intermittent personal experience extending over a score of years coupled with more than the average number of financial vicissitudes.

The manufacturers and dealers are to some extent to blame for misconceptions in regard to the necessary outlay. While an immense amount of reading matter purporting to

be directions for the selection of a microscope has been printed it is still a fact that the very people to whom the microscope would be a useful tool are in total ignorance of the first essentials of a working outfit. For example, the uninitiated jump to the conclusion from a hasty look through a maker's catalogue that nothing but an extremely costly outfit is worth having at all. As a sample of the usual hand-book advice in a generally excellent little manual for beginners, ("Practical Hints in Microscopy," Clark, D. C. Heath and Co)., the author says: "Very cheap microscopes are useless for practical purposes." If reference is intended to the little toys with tiny French doublet objectives and stage room conspicuous by its absence the statement is correct. There are several low-priced instruments of American make, however, in which the really important features—lenses, stage-capacity, lighting and focussing facilities—are all up to the requirements of an earnest practical worker and the cost of which does not penetrate far into the second column of figures.

The first financial bump that the would-be microscopist runs into is the objective. This is the lens that does the real business at the bottom end of the tube. This toe-scratched boulder may be softened by the comforting assurance that 95 per cent of all botanical work may be well done with a good low-power objective (2-3, 3-4 or 1 inch) costing about $5. A 1-inch eye-piece costing $1.50 completes the optical necessities. A pair of eye-pieces one of slightly higher power and one considerably lower might be advisable. The shorter focal length gives the greater amplification but also tires the eyes quicker. Don't worry over magnifying power. This question is soon forgotten in actual work. Clear, crisp definition is of far greater importance than excessive amplification. The writer believes that even the tyro with a bank account had better do much preliminary work with low power lenses before experimenting with immersion objectives, etc. Wait until

you feel the need of a higher power objective before you buy one. By that time your acquired skill will enable you to use it safely and efficietly.

For more advanced work in plant histology a good 1-6 or 1-5 is needed and a double nose-piece to carry it and its low power mate. A "divisible objective" is one in which the front combination may be unscrewed, permitting the use of the back combination as a low power. Optically it does the work but practically its use is very tiresome. There is an ever recurring danger of dropping or scratching the front lens while making the change. Be content with a good low power alone until you can afford a 1-6 and a nose-piece to effect the changes.

Now as to a 'stand' as the supporting parts of the instrument, are collectively termed. A joint for inclination adds to the cost and is not an essential feature in botanical work. Plant tissues are usually examined in water or other liquid and consequently with a horizontal stage. In long continued examination of mounted specimens the inclined position of the tube is easier on the neck muscles of the examiner. Photo-micrography and the projection of images of mounted objects upon a screen also require a horizontal tube and consequently a joint for inclination.

If the mind's eye is looking ahead to original research into bacterology, diatomaceae, karyokinesis and other delightful polysyllabic possibilities it would be well to look out in advance for facilities for attaching a sub-stage condenser.

The writer once knew a boy who had the temerity to make a compound microscope. The result may have been lacking in mechanical precision but it afforded its owner a great amount of rational amusement. We are not advising a general following of such a plan but an ingenius amateur, handy with tools will really find little difficulty in making a temporary stand to support an eye-piece and objective in

proper position and effect a coarse focal adjustment of the lenses over a glass stage. The stage itself and the illuminating facilities may be a common dissecting microscope with wooden block hand-rests. The necessary lenses (costing $6.50) may afterward be used upon a regular instrument, the idea being only to enable a beginner to get an economical start.

Ada, Ohio.

THE SEED-PODS OF TRAILING ARBUTUS.

UPON a mossy hillside that I know, under the shade of forest oaks, I am sure of finding the earliest blossoms of the trailing arbutus; or, as New Englanders say, the May flower. The plant is an evergreen, and on winter days, when the snow lay thin, its cheerful leaves were pleasant to see amid all the cold brown litter of the woodland floor. Had we then looked closely along the tough stems we should have seen the flower buds already set—silent prophets of these present days of spring, when the blossoms, nursed in frost and ice, have expanded and are lending their quota of fragrance to the sweetness of the air.

As its name indicates, the trailing arbutus is a lowly plant, seeking no adventures in the upper air, but quite content to pursue its fortunes close to the breast of Mother Earth that bore it; and so, as its leaves have something of the appearance of another sturdy evergreen of our woods, the laurel, one sometimes hears country folk call it "ground laurel." And because it blooms in May and its flowers are usually suffused with pink, the people of some other sections know it as "May-pink."

In common with most people, who give small thought to flowers after their petals drop, I forgot with annual regularity my arbutus patches under the oaks when their vernal beauty had passed; until one day of a spring far spent, not many weeks after the bloom was over, my eyes was attracted by a

touch of color among the leaves, and stooping to examine the little trailing vines, I was surprised to find them heavy with bunches of fat seed vessels. Each pod was about the size of a pea, but ribbed and furry coated, dimpled at the top and rosy as some ripening peach of fairyland. They made a pretty sight—these nursling pods nestled amid motherly leaves—and though they are no great rarity if sought for, yet if I should have taken a bunch of them home and shown them to a hundred people who that spring had joyed in the spicy perfume of arbutus flowers, possibly not one would have known what these pods were. Nevertheless these—rather than the blossoms—represent the goal of the plant's life of a year; for upon these treasure boxes, which in summer days crack open and scatter a myriad seeds abroad, rests the hope of the trailing arbutus's continuance in the earth.—*C. F. Saunders in The Churchman.*

A NEW FERN.

BY WILLARD N. CLUTE.

WITHOUT doubt the fern flora of our country is better known than any other part of the plant covering. New species of algae, fungi, mosses and flowering plants are constantly being described but the finding of a new fern is an exceedingly rare event. This is due in part to the thoroughness with which our ferns have been studied and in part to the small number of ferns that grow in our region. Ferns are, of course, most abundant in moist tropical regions and decrease in numbers as we go from the equator to the poles, or from the valleys to the mountain-tops. In North America, north of Mexico, there are probably not more than 225 different species, though the range of several is continent-wide. With changing ideas of species and varieties, forms of these better-known plants may be described as new species from time to time, but species that are absolutely new, in the sense that they

ASPLENIUM FERRISSI.

are quite unknown to science, are scarcely to be expected from this region.

Future additions to our list of fern species are likely to come almost entirely from the Southern and South-western States and to consist not of new species but of species from further south which have reached our region by wind-blown spores. Several such have, within recent years, been reported from southern Florida and the possibilities for other finds is believed to be still good. The fern here illustrated, however, does not belong to this category, but appears to be absolutely new to science. Moreover it belongs to a section of its family that is far from common, for in the great *Asplenium* alliance, while there are species with both simple and compound fronds, the plants with simple fronds are greatly in the minority and those with pinnatifid fronds, similar to our specimen are seldom found at all. The only other pinnatifid spleenwort in North America is the rare *Asplenium pinnatifidum.* The new plant was discovered in Arizona not far from Fort Huachuca, in the autumn of 1907 by Mr. James H. Ferriss for whom it was named in the January *Fern Bulletin.* Only a small colony was found in a little-frequented canyon and so far as known this is the only station for it. It is likely, however, that the same plant may be discovered in Northern Mexico, when that part of the world comes to be thoroughly known, botanically.

RELATIVES OF THE MUSHROOM.

THE mushrooms and toadstools, although the most conspicuous of the higher type of fungi, are not the only representatives of the group in America. There are many curious forms in field and wood rather closely related to them, but which none but the student of such things would think of placing in the same category. They are familiar objects to the saunterer although he is usually unable to name them, for as

yet books which treat of them have not become common; in fact, the species are so numerous, that it may be doubted whether we shall ever have manuals for identifying all of them as we have for the flowering plants. The more individualized specimens however, are easy to recognize and it is possible to have a "speaking acquaintance" with many of them without a manual.

It may be said by way of preface that none of the fungi are poisonous to the touch, however harmful they may be when taken into the stomach. The beginner can make his investigations in perfect safety. Some allied groups are much like the mushrooms in appearance. Certain species of the hedgehog or spine mushrooms (*Hydnum*) for instance, have the conventional mushroom cap, but underneath instead of gills, there are numerous little teeth which bear the spores. There are many species in this genus, which present great diversity of form. Some have stems and caps, some are stemless and others again have stems with apparently no caps. In all, the spores are borne on little teeth, or tooth-like projections, which circumstance gives the name of prickly fungi to this family. A few of the species are edible, but a large number are too small or inconspicuous to be of any account.

Another group of mushroom-like fungi, belongs to the genus *Boletus* and its allies. They are so little known to the public as to have no common names, but are, nevertheless, fairly abundant, both as regards species and numbers. They are mostly fleshy plants with cushion-like caps, the under surface of which is full of tiny rounded openings. These pores are the mouths of small tubes extending into the interior in the lining of which the spores are borne. When they are ripe, they are poured out through the tubes. Some of the species are edible, but one whole section in which the pores are red-bordered is considered poisonous. In this case, Nature has kindly hung out a danger signal that "all who run may read."

Another edible species classed with the Boleti is in shape, color and taste so much like a piece of meat as to have received the name of vegetable beef-steak (*Fistulina hepatica*). Some persons are very fond of it. It is a large, oblong, dark red species found on dead oak and chestnut trees late in the season. It is also called oak-tongue, and beef-tongue. Specimens weighing thirty pounds have been recorded, but the ordinary ones are much smaller. The majority of the Boleti have central stems like the mushrooms but the vegetable beef-steak and some others, have stems at the side which point out their relationship to the shelf fungi. In fact, it is often a difficult matter for the novice to distinguish between them.

The shelf or bracket fungi, are familiar to everyone who has visited the woodlands, although they may not recognize their plants by these names. A large number belong to the genus *Polyporus* which has given the name Polyporaceae to the whole group. These are the species that form the hard corky or woody shelves of semicircular outline which grow on dead trees, fallen logs, old stumps, etc. Some are annual, but others live for a series of years, in spring renewing their youth and adding to their bulk by the growth of another layer on the outer edge. The upper surface is usually brown and wrinkled, but beneath, it may be pure white, orange, lemon or red, especially when young. A close examination of the under surface shows myriads of little round openings through which the spores are discharged much as in *Boletus*. The under surface of some species turns brown with age, or when bruised. People with artistic tastes take advantage of this and by etching scenes and names upon them, form pleasing and permanent records of their summer outings. Recently one of the English magazines gave considerable space to descriptions of landscapes etched thus by an American lady. Just before the fourth of July, the shelf fungi assume some importance in the eyes of the country boy who collects and dries

them for use as "punk" for lighting his fire-crackers on that holiday. A very few species of this group are edible when young, but the majority would only be called so by the small larvae which delight to make tunnels through their substance. Some species of *Polyporus* grow to be more than a foot across the largest diameter, but others are small or minute. There are about four hundred kinds in America. Many species are found only on certain kinds of trees, but others are not so fastidious and grow on almost any dead wood. One often sees them on the shade trees along city streets, or upon old fruit trees in the garden.

Another group, whose affinities are with the mushrooms, although they do not look in the least like it, are the fairy clubs (*Clavaria*). To this group belong many of the branched fleshy coral-like growths found on old stumps and on the earth in woods. They are often very handsome in appearance, in color ranging through white, yellow, brownish, red and purple. The spores are produced at the ends of the branches. All the tender species of *Clavaria* are edible, but there are many too tough and leathery for food. Dr. Peck writes, "There is no dangerous species in the genus."

Nearly all the higher fungi are pleasing to the eye, but there are other senses which must be taken into account when approaching some of them. This is especially true of the genus *Phallus* and its allies. People have been known to search a long time for the dead animal which judging from the odor, they were convinced must be about the premises, only to find at last that they had been passing and repassing the author of all the mischief in this innocent looking specimen of fungus. When located, the discoverer's astonishment and disgust are about equally mingled. Generally the offending specimen is removed and burried and the householder congratulates himself upon the end of the trouble, but in a few days, the horrible odor proclaims that another *Phallus* is born. Since the por-

tion above ground is only the fruiting part, picking it off only induces another to develop. To be entirely rid of the objectionable squatter, the owner of the land must dig up the soil where it grows to destroy the underground vegetative portion. While doing so, he may console himself with the thought that these plants "attain their highest development in warmer latitudes." In Europe the peasantry call them the Devil's horns or Devil's stinkpots. In this country they are usually designated as stink-horns. They ordinarily consist of a thick white stalk from two to seven inches long, which in our common species, is capped with a conical structure covered with a slimy green substance that contains the spores. The plant has cunningly planned to have the insects instead of the wind, distribute its spores and is one of the few fungi that has evolved such methods. The odor, so vile to our nostrils, attracts the flies, just as the odor of the carrion-flower does, and these insects walking about over the fungus, get the spores attached to their feet and legs and so distribute them..

The morels are much like the stink-horns in appearance but have no offensive odor. The common species may be known by their netted or honeycombed caps. They are found growing beneath trees. Some specimens grow to be a foot high, but much lower plants are the rule. They are plants of spring and early summer, disappearing in the northern states by July. "No morel is known to be poisonous," writes Dr. Peck, "they can therefore be eaten with considerable confidence, even if the specific differences are not well understood."

Probably the best known of the mushroom's relatives are the puffballs called also Devil's snuff boxes. Most of these belong to the genera *Lycoperdon* and *Calvatia*. Few who have visited the country in autumn have failed to notice the round papery-skinned objects which upon being pressed between thumb and fingers eject a smoke-like cloud. The particles which form this cloud are the spores and the papery globe is

the mature state of the puffball. In this state, they are, of course, not edible, but the young ones are far different things. Then they are, in shape and appearance much like a loaf of half baked bread, the interior flaky white, and looking good enough to eat, as in truth, it is. "No deleterious species of puff-ball is known" writes Dr. Peck, and one may try his taste for fungi upon specimens of this order without fear of evil results. So long as the flesh is perfectly white, it may be eaten. The usual way of preparing it, is to slice thin and fry in butter, although other more elaborate ways of cooking are also practiced. Specimens of the giant puff-ball have been known to reach a diameter of two feet or more. Ordinary specimens are not half so large but a much smaller one will furnish a meal for an ordinary family. When one finds one of these large specimens, he may carefully slice off from the top as much as is needed for a meal returning later for a fresh supply. The puffballs are in their prime in late summer and autumn and may be found in fields and thickets. In one genus of puffballs, the spores are ejected through a ragged circular opening at the apex; in others the apex splits down irregularly, allowing the spores to escape. In some places there is a belief to the effect that if the spores are allowed to get into the eyes, blindness will result. A most curious and interesting little species with the look of an ordinary puffball when growing, is the earth star (*Geaster*). It is common in sandy situations. At maturity the outer skin splits downward from the apex into several radiating points which remain attached to the ball at the base. When the day is fine and dry, these points wrap about the ball and the wind can blow it about, disseminating the spores. During wet weather, however, the rays spread out and thus anchor the plant to the soil until favorable weather comes again. Other species have the rays of the star recurved in such a way that it appears to be standing up on claws.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their shorter botanical items. The magazine is issued as soon as possible after the 10th of February, May, August and November.

BIRDS-EYE MAPLE.—The cause of the peculiar arrangement of the woody fibres in maple which give it the well-known birds-eye appearance has never been adequately explained by scientists. A recent writer believes the "eyes" to be due to the formation of adventitious roots on the stem which do not continue to develop. They are supposed to arise from abnormal medullary rays. It may be pointed out in passing, however, that the maples rarely produce adventitious roots.

PLANTS THAT SELDOM FRUIT.—In volume 13, No. 2, of THE AMERICAN BOTANIST, mention is made of the groundnut (*Apios tuberosa*) and lily of the valley (*Convallaria majalis*) rarely fruiting. On the shore of Watchie Pond, in Maine, in September, 1904, I came across the *Apios tuberosa* with the vines heavily fruited. I gathered and planted some of the small peas but got no plants from them. At the same time Mr. Scoullar transplanted some of the tubers, giving them the same soil, and similar exposure. Although these vines have multiplied, grown finely, and bloomed profusely, they have not borne fruit. I have watched them during their blooming season, for the past three years and I have never seen the flowers visited by any insect. Can cultivation have

caused the barrenness of the vine? I have a bed of one hundred plants of the *Convallaria majalis* transplanted in the fall of 1906 from a partially shaded situation into full sun light. Being away from home all summer the flowers remained on the plants, and in October of last year, nearly every plant bore a cluster of bright red fruit.—*Mrs. A. E. Scoullar, Elizabeth, N. J.* [We are glad to have this note which shows that while these plants rarely fruit it is not impossible for them to do so. *Apios* at least has a most ingenious device for securing cross-pollination, and is frequently visited by bees, but for all that the seeds are very rare. The editor has never seen one though quite familiar with the plant for years. It is quite possible that the cold of early spring may be responsible for the frequent failure of convallaria to fruit.—Ed].

Notes on Fasciation, Peloria, etc.—In the freaks that nature occasionally produces we often get glimpses of her methods that are not to be seen in normal plants. The following list of titles of articles on such subjects that have appeared in this magazine will therefore be of interest. The number preceding the colon refers to the volume, the other to the page. Fascination 2:81, Fasciated dandelions 12:117, Metamorphosis 9:82, Flowers turned to leaves 5:69, A curious columbine flower 9:48, Double flowers 1:71, Origin of double flowers 1:66, A freakish datura 11:42, Triple Jack-in-the-pulpit 8:35, A double cinque-foil 4:97, Peloria 9:95, 12:66, Twinned pistils of partridge pea 12:65, A freak among violets 7:32, Origin of cut-leaved sumac 12:92, Origin of a violet berry 6:15, Cohesion 7:97, Galium leaves that are not leaves 11:88, A gigantic bud 7:12, Prolification of fruits 12:20. Any single volume may be had for 50 cents or with a year's subscription for 40 cents extra. The numbers are not sold singly. Price of full sets will be found in the advertising pages and other lists of titles in recent numbers.

Yellow Pond Lily.—In addition to the common names for this plant, *Nuphar advena,* given in a recent number, we may add cow lily, three colored lily and globe lily, the latter quite as appropriate a name as any of those by which it is more commonly known.

Changing Styles in Flowers.—It is apparent to all lovers of the beautiful that the beauty of certain flowers cannot be enhanced by doubling. All regular, errect flowers and such others as do not depend partly upon form for their attractiveness, may be doubled without detracting from their appearance; in fact, a "single" water-lily, that is, one with but five petals and five sepals, would be ungraceful enough, but the thoughts of double orchids or sweet-peas or pansies are enough to make one shudder. We learn from a recent number of *Horticulture* that that monstrosity the double violet is fast giving way before the single sorts, a fact upon which all gardeners should congratulate themselves .

Poison Ivy.—Each recurring spring brings forth a fresh crop of people poisoned by poison ivy (*Rhus toxicodendron*) and poison sumac (*R. venenata*). It may interest them though it will not relieve their troubles, to know that the poison is reputed by some to be due to an acid called toxicodendric acid and by others as due to an oil called toxicodendrol. What ever the cause of the poison, the intolerable itchiing may be allayed by a variety of alkalies. The old fashioned remedy was a poultice made by spreading "soft" soap on a piece of bread and applying it to the infected part. Now that soft soap has given way to the various bar soaps, the cheapest laundry soap will do just as well. Washing soda or sodium hyposulphite is recommended and painting the poisoned part with collodion has its adherents, also. Rhus poisoning and the disease erysipelas have many characteristics in common. Cows and sheep eat the plant without harmful effects. It is said that

leaves of various species of sumac (*Rhus*) have the property of expelling their resin with noticeable violence when placed in water, but like many another "it is said" nobody seems to have looked into the truth of the matter. We shall be glad if any-one can enlighten us.

SURVIVAL OF THE FITTEST.—Natures's ways are often very grim and relentless. In the upbringing of her gentle progeny, the flowers, she does not spare the chastening. Days of fitful sunshine now alternate with lashings of icy blasts, with deadly frost grips and pitiless numbing torrents. Great is the slaughter among the innocents that the harvest of blooms may be forthcoming in greater perfection. The law of the survival of the fittest is as inexorable in the vegetable kingdom as elsewhere and the graceful delicately-fashioned blossoms that deck field and garden often come, like most things of worth, out of great tribulation.—*Gardening World.*

EFFECT OF IMMATURE SEEDS.—The majority of seeds will not grow as soon as ripe, but demand or require a season of rest before continuing growth. Some, however, not only grow as soon as as the containing fruit is ripe but even before this. The tomato plant is one whose seeds behave in this manner. In general plants grown from such immature seeds fruit earlier than others of the same species, but the fruit is likely to be small. If the practice of growers is to be a criter-ion, even the size of the seeds may indicate something of the vigor of the crop they will produce. Cabbage growers always reject the large seeds, holding that such seeds give rise to plants that produce leaves rather than heads. The same belief causes them to prefer old cabbage seeds to fresh ones and they commonly use seed that is two or three years old. Growers of squashes, cucumbers and melons insist that the older such seeds are, the better, so long as they will grow, since old seeds produce more fruit of greater fleshiness.

TRILLIUM GRANDIFLORUM.—This well known member of the *Trillium* genus has a variety of names though wood lily is doubtless the one by which it is known most commonly. Wake-robin, three-leaved nightshade, birth-root or beth-root, ground lily and butter-milk lily are among its other names. The entire genus is reputed to have medicinal properties and it is said the white men learned their use from the Indians. It is stated that the root of *T. grandiflorum* if chewed produces tears and salivation and leaves a burning sensation in the throat which is succeeded by a sensation of cold over the whole body. The Indians of Missouri called it by a name which means heat-and-cold. It was reputed to cure snake-bite and gangrene and the Indians thought that the red trilliums were best for males and the white ones for females. Many believe the berry-like fruits to be poisonous but this does not appear to be true. It is probably a survival of an idea that was common when the plants were regarded as members of the nightshade family.

SEA-WEEDS AS FOOD.—Every year the Japanese take from the shallow waters on their coasts more than two million dollars worth of algae or sea-weeds, and while this method of farming the sea is not so well known in other and more tropical islands, there is still considerable business done in the collection and sale of these plants. In the Hawaiian Islands the annual sea-weed crop is valued at many thousands of dollars. The Hawaiians call the sea-weeds of all kinds limu and eat seventy-five of the hundred or more species abundant along their thousand miles of coast. They are commonly eaten raw, with a little salt and accompanied by shell-fish and other marine animals, also usually raw. In other days they served to garnish the pig or dog that formed the feature of their feasts. Some of these sea-weeds are said to be acceptable to Caucasian palates, but the majority are rather too strong or bitter. All of them must have been particularly wel-

come to the Hawaiians, however, for until 1819 any woman who ate bananas, cocoanuts, turtles or pork was put to death. With these things off the native bill-of-fare there does not seem to have been much left in the larder except sea-weeds. Besides serving as food-stuffs, certain species furnish a vegetable gelatine or glue. The well-known agar-agar of the bacteriologist comes from this source.

Animal-like Mushrooms.—The fact that mushrooms, and all other fungi for that matter, are unable to make food for themselves and must secure food, as do the animals from living or dead organic food is pretty well known to students of plants but another animal-like character is less familiar. This latter is seen in the tendency of the fruiting part of the mushroom to take on a definite shape. Ordinary plants do not have a definite form which they assume when mature, except in a very general way, but the mushroom may be depended upon to take on the regular mushroom form.

The Value of Bees.—At first thought one would be inclined to say that the chief value of bees to man is found in the honey which they store, but it is quite posible that we have over-looked a still more important feature. Many fruit bearing plants are largely pollinated by bees and when from any cause, these insects are scarce at flowering time a short crop is likely to be the result. A continued spell of cold weather which is not cold enough, to kill the blossoms may still cause a failure of the crop by lessening the activity of the insects. Some writers in the agricultural press are urging fruit-growers to go in for bee-keeping. By this means the grower should not only get a better crop of fruit but many pounds of honey as well, the latter no less a product of his trees than the fruit, but a crop that is seldom taken into consideration when valuing an orchard.

PERFUMES FROM PLANTS.—Many perfumes and flavorings that were once obtained from flowers, fruits or leaves are now made by the chemist in his laboratory, but we have not entirely given up the vegetable world as a cheap and convenient source of stimulants to our senses of taste and smell. Of such products we still import several million dollars worth each year. Some of the most familiar plants used for perfume are almond, caraway, fennel, jasmine, citron, lavender, lemon, orange, rosemary, rose thyme violet geranium, acacia and tuberose. There are four principal ways of obtaining the perfume depending upon the kind of plant used. For those with abundant oil, such as the orange, the fragrant part may be obtained by pressure. Others, like peppermint, birch, sassafras and wintergreen require distillation. Maceration consists in immersing the plant parts, usually flowers, in melted grease, while enfleurage, the most delicate of all, is carried on by placing the flowers on sheets of glass which have been covered with a thin layer of grease. The characteristic odor of any of our fragrant species may be brought out by one of these four methods. In general the essential oils are obtained by distillation and the more delicate odors of flowers by maceration or enfleurage. Anyone with an experimental turn of mind can easily make a still and derive considerable pleasure from the distillation of various plant oils. All that is needed is some kind of a boiler and a few feet of pipe for the "worm" through which the vapor from the boiling plants is led until it condenses. The worm is kept cool by a constant flow of cold water over it. Among our native plants from which perfumes and oils have been extracted may be mentioned sweet golden-rod (*Solidago odora*) Canada ginger (*Asarum Canadense*) magnolia, birch, wintergreen, sassafras and bergamot.

THE PERSIMMON.—The persimmon (*Diospyros Virginiana*) was one of the first fruits to come to the attention of the early settlers of America and in an ancient "Historie of Travaile into Virginia Brittania" the author pays his respects to it in the following language: "They have a plumb which they call pessemmins, like to a medlar in England but of a deeper tawnie cullour; they grow on a most high tree. When they are not fully ripe, they are harsh and choakie, and furre in a man's mouth like allam, howbeit being taken fully ripe, it is a reasonable pleasant fruit somewhat lushious. I have seen our people put them into their baked and sodden puddings; there be those whose taste allows them to be as pretious as the English apricock; I confess it is a good kind of horse plumb."

NATURE IN A FOREST.—When you wander through a forest you feel what the ancients called "the sacred horror of the woods;" you understand that mystery surrounds you, and in the undefined shades spectres float whose outlines you dare not fix. It seems as if you were intruding upon and disturbing the solitude, and that at your approach some one had retired. The trees, plants and flowers appear to change the subject of their conversation, as it is done in a drawing-room when an intimate chit-chat is interrupted by some unwelcome visitor. Perhaps you were on the point of detecting nature's secret, which man seeks to unravel; but were your tread as light as that of a red Indian in his moccasins, your foot has moved a stone, made some grass rustle and dewdrops fall from a wild flower. All at once a little bird darts away and goes to inform the old oaks of the approach of an enemy. The forest is circumspect, and says only insignificant things; the flowers fold up their corrollas and the singers are hushed. For a while life seems to be arrested; after a little time, when you are found to be a harmless dreamer, a poet incapable of

those useless murders so remorselessly committed by sportsmen, all that timid world is reassured. The trees talk with the wind; the birds, resuming their prattlings, hop through the branches; the gnats re-commence their waltzes in the luminous streaks of light wherein their balls are given, and Nature attends to the little affairs exactly as if you were not there.—*American Farmer.*

RUE SPLENWORT AND CLIFF-RRAKE.—Up to the summer of 1907, my personal knowledge of rue spleenwort, (*Asplenium ruta-muraria*) and purple cliff-brake (*Pellaea atropurpurea*) was confined to the lime rocks of Central Valley, Orange County, N. Y. Here the former grew so tightly wedged in the crevices of rocks, that only the point of a hat pin or scissors could dislodge its tiny root. The latter gained the name "neck-break" from the fact that the three or four fronds we saw, grew at the top of very high rocks, straight up in the air, so that it was always dangerous to attempt to get near it. While out with the botanists at Newton, N. J. last July, imagine my bewilderment at meeting many low rocks, not only covered with sturdy specimens of rue spleenwort and purple cliff-brake, but the same ferns almost coming to meet us, on the ground between the rocks and the path. I had heard of other places where this happens, but seeing is convincing. The maiden hair, ebony spleenwort and maidenhair spleenwort were plentiful, as were many other ferns. On one trip three rocks at various points were found to have ten different kinds of ferns on them. Dr. Philip Dowell had the good fortune to find *Asplenium ebenoides* (Scotts spleenwort), in fact many of the best things came his way, so that during the evening session, a number of us would await with great interest, the opening of his press, when his turn came to relate what the day had brought forth.—*Pauline Kaufman, New York City.*

FIELD BOTANY

Edited by Dr. H. A. Gleason, Urbana, Ill.

FOREWORD.

We shall try to publish in this department short notes devoted to various phases of outdoor botany and to methods of collecting plants, selecting especially those things which will be of interest to the younger readers. Everybody knows that in studying botany at least some of the work must be done indoors, but when we use botany for a recreation, then let's get outside. Let us confess that the whole purpose of this page is to get you outside, where the plants actually live and where you can meet and know them at first hand.

Then possibly we can be of some assistance to you in your botanical work. If you meet with some question that you cannot answer, send it in. If you have a plant that you cannot name, send it in. In every case we will do our best to help you. And, on the other hand, if you find a rare plant in your vicinity or if you make any interesting observations on plants, tell us about them also, and help us fill up these pages. All communications intended for this department should be addressed to Dr. H. A. Gleason, University of Illinois, Urbana, Ill.

What is our earliest flower? Professor Bailey tells us in the January number of the *American Botanist* that the whitlow-grass, *Draba verna,* is the first to bloom in southern New England. Over many parts of the Middle West the whitlow-grass is not found, and the honors for earliest blooming fall now to one plant, now to another, depending on the locality. Here in central Illinois the earliest seems to be the harbinger-of-spring, *Erigenia bulbosa,* which in 1908 was in bloom at

Danville on March 14. But *Erigenia* is very uncommon, and in most places hepaticas are the first bloomers, and may usually be expected on or before the same time, and both are closely followed by bloodroots and spring beauties.

* * *

Speaking of early flowers, there are some trees and shrubs blooming in March which we frequently overlook. The soft maple puts forth its dull red flowers by March 20. When the first hepaticas appear the hazel is in full bloom. Its long yellow catkins hang pendent on the twigs, and the slightest jar is sufficient to release a shower of yellow pollen. Spicebush comes out at the same time with the bloodroot. Its yellow flowers are more conspicuous than those of maple and hazel, and secretes a good supply of honey, which attracts some of the early flies. One may often see them perching upon the unopened buds, very likely trying to steal the honey from within.

* * *

On May 1, *Phlox Stellaria* is in bloom at Grand Tower, Illinois. What! you are not acquainted with *Phlox Stellaria?* Well, possibly not, because it is one of the rarest plants in the eastern States. So far as known it ocurs at but two places, Grand Tower, and Lexington, Kentucky, in each place growing upon limestone cliffs. At Grand Tower there is a series of cliffs nearly a mile long, facing the Mississippi river, and in the spring they are almost hidden by the light bluish-purple flowers of this Sweet-William. The roots penetrate into the clefts and fissures of the rock, so that the plants grow in rows marking the course of each fissure. The stems are not over eight or ten inches high, and quite bushy, and the leaves are stiff and narrowly linear. The petals are deeply notched at the end. In this feature it closely resembles the related *Phlox bifida,* which has a much wider distribution, but is also scarce. The cliffs where *P. Stellaria* grows get the full force of the afternoon sun and become very hot; too hot, in fact, for plants

to grow well. When summer comes the leaves wither and die, and by August all the above-ground parts are dead, and only the subterranean parts, sheltered in the fissures of the rock, remain to carry the plant through the winter.

* * *

The harbinger-of-spring, *Eringenia bulbosa,* illustrates very well the habits of some of the early spring flowers. The flowers are in a close umbel; the petals are white, but the red anthers give a pink tone to the whole umbel. Only the flower-stalk and flowers are above ground when they first come into bloom. A few inches down is a small tuber from which the flowering stems arise. This tuber explain the secret why *Erigenia* can bloom so early in the spring. Carefully stored up in the tuber is a supply of food saved from the preceeding year, and ready for immediate use on the first warm days of spring, so that no time need be lost by the plant in manufacturing the food necessary for its growth. This habit is adopted by many other spring flowers, such as trillium, Dutchman's breeches, spring beauty, dog-tooth-violet, toothwort and bloodroot.

THE LIGNON-BERRY.—According to *Gardening* an effort is being made to introduce into cultivation in this country a Swedish berry called the lignon-berry. At present a considerable business is done in importing the ripe fruit which finds favor in Swedish communities. In the home of the AMERICAN BOTANIST the lignon-berry, or as it is pronounced here, the lingen-berry is often found in market. It is a dull, dark red berry about the size of our cranberry and with a similar flavor. It is very evidently a product of some member of the heath family, but what one we are not able to say at present. Doubtless some of our readers, on this or the other side of "the pond" can inform us. It may be queried whether lingen-berry is not derived from the same word, ling, by which the heather (*Calluna vulgaris*) is sometimes called.

EDITORIAL

When we decided to change this magazine from a monthly to a quarterly at a reduced price, we had some concern as to how our subscribers would accept the change. We are glad to report that up to the present we have not lost a subscriber in consequence of it. And we are inclined to think that the present issue will strengthen the good impression the magazine is making. Owing to the fact that our stock of odd numbers is about exhausted, we no longer offer to send copies of the numbers of the first 13 volumes to replace soiled or missing numbers. We also limit the offer of back volumes to subscribers at half price to the ten days following the receipt of this number. After that the discount to subscribers will be 20%. During the past month we have sold more back numbers than in the entire year preceding and subscribers generally have shown a disposition to take advantage of our remarkably liberal offer and fill up their sets. If you intend to have a complete file of the magazine do not delay longer. Some of the early volumes are becoming rare.

* * *

Without doubt there are many people who never get very deeply interested in botany because so much of it is to them as a sealed book. They may be attracted by the beauty and perfume of the flowers, but any further study of the plants so soon leads into a maze of technicalities that the majority give up in disgust. Even the botanical magazines, though popular enough at the start, soon grow to be too technical for any but those who started with them. We have long been of the opinion, however, that any magazine should not be run entirely for the most learned among its readers, but the great difficulty has always been to get some one who could handle a department for younger

readers and *keep it young*. So far as this magazine is concerned we have solved the difficulty and with this issue open a department that is primarly intended for young readers, but doubtless will be read by everybody. This department will be under the editorship of Dr. H. A. Gleason, of the University of Illinois, an enthusiastic advocate of out-door botany who believes that plants have so many points of interest that everybody should know and love them. Dr. Gleason sincerely desires to be of use to all plant students in need of assistance. It is seldom that a man of Dr. Gleason's attainments so freely offers his services and we trust our readers will be quick to take advantage of the offer. If there is anything puzzling about plants that you want to have cleared up, write to him about it. Send him your botanical notes and opinions. Some of these will be printed and all will be attended to, either by mail or through the department.

* * *

Our offer to send this magazine a year and a half for a dollar or two years for $1.25 is for strictly cash in advance subscriptions. Subscribers to this magazine whose subscriptions have expired cannot take advantage of this offer unless they renew within 30 days after the receipt of this issue.

BOOKS AND WRITERS.

The University of Washington will open its marine station at Friday Harbor, Washington, for the 5th annual session, on June 22, 1908. The length of the session will be six weeks. The staff will consist of Dr. Charles W. Prentiss of the department of Zoology of the University of Washington, Dr. Robert B. Wylie of the Department of Botany of the University of Iowa, and Professor Charles O. Chambers of Pacific University, Forest Grove, Oregon. The chief features of the station are its location in the heart of an evergreen

forest in the winter rain belt, the abundance of marine plants and animals, its constant use of the dredge, and its small fees ($13.00). Under the direction of Dr. T. C. Frye, of the Department of Botany of the University, a field-trip to Alaska will be made about July 1st, the party going as far north as Skagway and staying about six weeks. Those who make this trip and carry on the required work will receive the same credit as if they did the work in the University.

The second edition of Green's "Vegetable Physiology" presents few differences from the original issue, but the appearance of the new edition may well direct attention anew to the scope and general excellence of the work. Unlike many texts in which the divisions of vegetable physiology are treated topically with often very little apparent relation between the parts, there is in this book a continuous connecting line of relationship built up bit by bit from the first chapters on the general structure of plants and the differentation of the plant body to the nervous mechanism of plants and reproduction at the end. Between these topics there are twenty-one others dealing with the skeleton of plants, the relation of water, air, and food to the plant, methods of obtaining food, the storage of food, digestion, growth and the influence of temperature and environment on plants. Teachers, and others, interested in the physiology of plants will find the lucid account of the subject very attractive. The book contains 450 pages and nearly 200 illustrations. It is published by P. Blakiston's Son & Co., Philadelphia, at $3.00 net.

The recently issued "Elements of Biology" by George William Hunter is an excellent example of a book written to order. It follows closely the "Syllabus for Secondary Schools" prepared by the New York State Education Department, but it may safely be predicted that if New York State pins her faith to such a mixture under the guise of biology her

students will soon drop behind those of other states. If one is to have a year of biology there seems to be no reason why he shuld not have a half year of sound botany and another of zoology with some human "physiology," which is mostly anatomy and hygiene, thrown in for good measure instead of one book covering all three subjects. The book in question contains 430 pages, of which 178 are devoted to botany, 138 to zoology and 114 to physiology and therefore fairly well proportioned for the business in hand. The two greatest faults the reviewer finds in it is that it is based on the "verification" method and has the laboratory directions mixed with what should be the text. In our opinion the laboratory is no place for a text-book. Here at least, the pupil should study the things, themselves, and be forbidden to crib his facts from the book. The questions should be so worded that he must study the specimens for his answers. In these features the book is far below standard. Certain loose expressions also, may be mentioned such as that buds "come out at the ends of the branches," that "the protoplasm in some cells collects into bodies called plastids" and that self-pollinated flowers "do not produce so many seeds or seeds with so much vitality as those which are cross-pollinated." This latter fact is disproved in every weedy garden in America. In our opinion such topics as the homology of the flower and the history of the discoveries regarding fertilization (pollination?) may well be omitted with first year pupils in the high school. The arrangement of the subjects in the part devoted to zoology follow the accepted sequence from the simplest to the highest types, but in the botanical part the cell is first studied followed by the flowers and fruit doubtless in deference to Lloyd and Bigelow's opinion on this subject. In favor of the book it can be said that it is profusely illustrated and admirably printed and contains a vast amount of information that every teacher may well be glad to have though it is far in excess of what the pupil

can properly get over in a single year. The book is published by the American Book Co.

The American Nature-Study Society formed at Chicago during the Christmas holidays already has a membership of nearly one thousand members and includes nearly everyone of prominence in the Nature-Study Movement in America. The Council of the new society will continue the publication of the *Nature Study Review* which was founded by Prof. M. A. Bigelow. This will be sent free to members. The annual dues are $1.00. Application for membership should be sent to the Secretary, Teachers' College, N. Y. City.

The first number of the *Guide to Nature,* a finely illustrated and well printed magazine hailing from Stamford, Conn., has appeared. It is edited by Dr. Edward F. Bigelow who is no novice in natural history magazine publishing, having owned and edited the old *Observer* for many years, in addition to writing and editing various other books and publications devoted to nature. Under his guidance we expect to see it quickly take first rank among publications along similar lines.

An interesting and valuable little manual for tree-study, published by the State of Massachusetts for its citizens is entitled "Forest Trees of Massachusetts" by D. A. Clarke. In upward of sixty pages the trees are described and their leaves, flowers, fruits and twigs figured. Usually when anything is given away, it does not amount to much, but this does not apply in the present instance. Our New England readers, at least should have it. It is distributed by State Forester F. W. Rane, State House, Boston.

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CONTENTS

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WILLARD N. CLUTE ❧ ❧ ❧ EDITOR

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THE RED TRILLIUM.—*Trillium erectum.*

THE AMERICAN BOTANIST

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"GOD Almighty first planted a garden. And, indeed, it is the purest of human pleasures; it is the greatest refreshment to the spirits of man; without which buildings and palaces are but gross handiworks: and a man shall ever see that, when ages grow to civility and elegancy, men come to build stately sooner than to garden finely; as if gardening were the greatest perfection." — Lord Bacon.

A REMARKABLE CHANGE OF COLOR IN TRILLIUM.

BY WILLARD N. CLUTE.

BOTANISTS in general are well acquainted with the changes in color that take place in many species of flowers as the inflorescence progresses from buds to blossoms. Familiar instances are found in the wild crab (*Pyrus coronaria*) whose red buds become pink flowers, in the lungwort (*Mertensia Virginica*) whose buds are pink but whose flowers are blue, and in the honeysuckle (*Lonicera Japonica*) whose full blown flowers are white but soon turn yellow.

These changes seem due to varying amounts of acids in the cell sap as the flowering period progresses but there is another series of color changes to be found in flowering plants whose effects are little known and whose causes are still more obscure. These changes are not confined to individual flowers but to the flowers of the species as a whole, and vary, not in the individual plant, but with the locality. One of the best

instances of this is found in the meadows lily (*Lilium Canadense*) which in New England is usually yellow, but in New York and farther west is deep red. In the "Natural History of Plants" Kerner gives several instances of this kind from the Old World. In the Alps, *Campanula trachelium* has white flowers in one district and blue in another, *Viola calcarea* has blue or yellow flowers according to the locality, *Astragalus vesicarius* is yellow or violet, *Anemone alpina* is white or sulphur yellow and so on through other species.

Fully as interesting as any of these is the case of the birth-wort or red wake robin (*Trillium erectum*) which differs so greatly in color with locality as to appear like two different species. In eastern America it is almost invariably dark purplish red in color; in the west it is as invariably pure white without even a tinge of red. The latter form is occasionally given the name of *Trillium declinatum* and to the casual observer at least would seem like a very distinct species. The flowers of *Trillium erectum* are somewhat variable in color as may be gleaned from the statement in the Manuals that they may be red, pink, greenish, yellowish or white. The greenish, yellowish and pink forms, however, are seldom found except in regions where the flowers are red and appear to be simply cases of partial albinism.

In my own locality the flowers of this species are pure white. In the spring of 1907, wishing to grow the red form for comparison, I applied to Mr. James Shepard of New Britain, Conn., who sent me about a dozen red flowered plants from that part of his state. Some of these were in flower and their color was unmistakable. They were set in my grounds, throve during the summer, and came up this spring but much to my surprise, every blossom but one is pure white, and this one only has a trace of red in the stamens. The question now is, what has caused the sudden change? Is it soil, climate, or some other more obscure cause? There are cases on record in

which plants with colored flowers upon being moved turned pure white, and plants poorly nourished have been known to make such changes, but in the plant under disucssion the flowers do not change to white when moved to different spots in the same general region, then why should this change affect them? I shall watch with interest the blooming of these plants in subsequent years. Meanwhile I am desirous of obtaining half a dozen plants of this red-flowered form from as many different regious as possible and offer in exchange an equal number of bulbs of the blazing-star (*Liatris scariosa*) or the nodding garlic (*Allium cernuum*). The plants wrapped in moist sphagnum may be safely mailed in any tin box—a nabisco wafer box is fine for the purpose—and may be sent during either spring or autumn. It is hoped that many responses to this offer will be received. In addition, if any gardening botanist in the region of the red flowered plants will undertake to grow our white flowered form and report results, I shall be glad to provide him with material.

Joliet, Ill.

RESTING PLANTS.

BY DR. H. A. GLEASON.

IT is sometimes surprising how a collecting ground with which one is perfectly familiar will yield new finds. Sometimes the new plants are small and inconspicuous so that they might have been previously overlooked; sometimes they are new introductions, just brought in by man, birds, or wind; but in some cases neither of these reasons will explain their presence. Then the botanist is at a loss to understand why he never found the plant before. Sometimes the plant in question has been dormant underground for a number of years, without blooming or sending up leaves. In this case it might be

roughly compared with the seventeen-year locust, which appears so suddenly after a long interval of years.

The habit of lying dormant is known to be true of some orchids, and is illustrated by some definite cases near Urbana. The white fringed orchids, *Habenaria leucophaea* or *Blephariglottis leucophaea,* formely grew in a swampy place near there. A railroad track destroyed the habitat, except a strip about a hundred feet wide and five hundred feet long. The orchis bloomed there in 1893, and, although careful search was made each following year, it was not seen again until 1900. For the four succeeding years the place was watched with great care, but the orchis never appeared, and in 1905 the station was destroyed by filling in with cinders. In 1901 the nodding pogonia, called variously *Pogonia pendula, Pogonia trianthophora,* and *Triphora trianthophora,* bloomed in the Brownfield woods, northeast of Urbana. The location of the rotten log on which it grew was carefully marked, and the place watched during the following years. It has not reappeared, but if it follows a seven-year rotation, as *Habenaria* apparently does, it might be expected again this summer. These woods are familiar to all the botanists of the vicinity, and have been for years, yet not until this spring was putty-root, (*Aplectrum spicatum*), found there. It had bloomed there last year, but in some way escaped notice.

Each of these three cases concerns species that are very rare or local in the vicinity and of which but few individuals have ever been seen. More remarkable in some respects than either of the three is the case of squirrel-corn (*Dicentra canadensis*). Many years ago it was found in the Brownfield woods. The writer was told of its occurrence there, and, beginning in 1899, searched those woods every spring for six years without finding it. One year he systematically examined a thousand or more plants of *Dicentra,* all of which proved to be the Dutchman's breeches, (*Dicentra Cucullaria*). Last

year the Blackberry woods, situated a mile away, were also carefully and systematically examined by two careful observers, and not a single plant of squirrel-corn was found, although the Dutchman's breeches was abundant. The flowers of the two species are so unlike that they may be recognized without hesitation at a distance of twenty feet, or even more. It would indeed be surprising if the squirrel-corn had been overlooked. Considering all the evidence, we are probably correct in concluding that for several successive years squirrel-corn did not bloom in this vicinity.

But this spring almost the reverse is true. In the Blackberry woods there is far more squirrel-corn than Dutchman's breeches. In the Brownfield woods both are very abundant, and one is as common as the other. One can seldom find a colony of one species without the other intermixed, or at least growing within a few feet.

How shall we explain it? Surely it is not a new arrival in the woods, for its means of dissemination are slow, there is no near source of supply and it has appeared in such great numbers at once. Possibly it has been dormant in the ground and has just this year completed the dormant period. But, if so, it is strange that the dormant period of all the plants should end at the same time. One would expect rather to find a part of them completing their dormant stage and blooming each year, while all the evidence shows that no plants at all bloomed last year or for several years past. The writer has personally no explanation to offer but makes the mere suggestion the squirrel-corn may have produced leaves alone for a number of years. In this form it would escape notice, for the leaves of squirrel-corn and Dutchman's breeches are indistinguishable. Possibly the exceedingly cold spring of 1907, or the very mild winter jnust ended, or some other climatic condition has been exceptionably favorable to squirrel-corn, and called forth the display of flowers this season. If

this is the cause, one should expect to find it unusually common this spring throughout the Middle West. The writer would appreciate information on this question, as well as on the distribution, habits, and relative abundance of the species as a whole. If either squirrel-corn or Dutchman's breeches lives in your vicinity, he will be glad to receive your notes and observations upon them.

The differences between the two may be briefly summarized. In squirrel-corn the plants are connected by root stocks, the tubers are rounded and yellow, the corolla is heart-shaped at the base with rounded spurs, the inner petals are large, and the flowers very fragrant. In Dutchman's breeches there is no rootstock, the tubers are small, brown, and ovoid, the coralla has sharp spreading spurs, the inner petals are small, and the flowers slightly fragrant. Both may be expected in rich leaf mold in woods·

Urbana, Ill.

BY THE PONDSIDE.

BY FRANK DOBBIN.

A student of botany is many times impressed with the significance of certain plant names, particularly the specific name. Many of them it is true are simply "names," vague and unmeaning, something by which the plant can be called, while others, by their reference to some peculiarity of the plant or to the locality of its growth, bring before the minds eye not only the plant itself but the spot where we first discovered it. Thus the words *natans, lacunosum,* and *aquaticum,* bring before us some water-loving plant gathered at the pond side or perchance pulled over the side of our boat as we lazily floated about on lake or stream in the still summer afternoon.

What an interesting place a pond shore is to a lover of botany! The muddier and boggier the better. Here may grow plants that are not to be found elsewhere, keeping one con-

tinually on the qui vive for something new or rare. I remember that in crossing the outlet of a little mountain pond one day on an old log I found the little sundew, (*Drosera rotundifolia*), in flower for the first time and reaching out from the same log with a stick I drew within reach a floating plant with a small, white flower which I found upon consulting my botany was the floating heart (*Limanthemum lacunosum*). It was my first sight of this little plant which is somewhat of a rarity with us, yet not so rare as to preclude all possibility of finding it.

Just beside the water or partly in it one should look for the swamp loosestrife (*Decodon verticillatus*), with its long wand of rose-purple blossoms bending gracefully over toward the surface of the water. A peculiarity of this plant is the thickened bark of the lower part of the stem, making it appear as if inclosed in a sponge. Then if the pond has a marshy border one is almost sure to find the button bush (*Cephalanthus occidentalis*), with its white sphere of blossoms and also the sweet gale (*Myrica Gale*) mingled with the alders and various species of willow. Here too is a favorite situation for the swamp rose (*Rosa Carolina*) and sometimes though not often the shining rose (*R. lucida.*)

It was by the borders of a lonely mountain lake that during the past summer I found the dalibarda (*Dalibarda repens*) forming thick mats of bright green under some of the great forest trees. In the margin of the same pond was growing the water lobelia (*Lobelia Dortmanna*), with its basal leaves entirely submerged but the seed-pod raised four or five inches above the surface.

In shallow ponds and ditches during May or early June one may sometimes find that curious floating plant, *Riccia natans,* varying in size from a pin head to that of a penny. This is sometimes called the purple-fringed riccia from the abundant purplish scales on the under side of the thallus. When

once recognized it can never again be mistaken. In similar situations is the yellow water crowfoot (*Ranunculus multifidus*) its fine feathery immersed leaves reminding one of the bladderworts, which later on will raise their hooded blossoms from many of our ponds and slow streams. These are beautiful and interesting plants varying in size from the little *Utricularia gibba* an inch or two in height to the greater bladderwort, *U. vulgaris,* which sometimes raises its scape ten inches or more out of the water. The *Potamogetons* from a most interesting group for the student, and our ponds and streams furnish abundant material for study. In fact it would be hard to find a pond without at least two or three species and some contain several more. The water shield (*Brasenia peltata*) can usually be found with the *Potamogatons* as well as a naiad (*Naias flexilis*).

Where the water is shallow, especially about the outlet, is apt to grow some of the tall rushes such as *Scirpus lacustris* or *S. occidentalis* which form dense thickets taller than a man's head and through which the boat is pushed with difficulty. The great yellow water lily, (*Nuphar advena*), is pretty sure to be present together with the white one (*Nymphaea odorata*) to which certainly belongs the distinction of being our most beautiful water plant. Another plant that loves the pond border is the pickerel weed (*Pontederia cordata*) whose violet-blue flowers, though somewhat ephemeral, give a dash of color on the back-ground of green. But space would fail me to tell of all the water-loving plants that haunt our ponds and streams. A day spent in their study is sure to be a pleasant one and the searcher is sure to return home with a crowded vasculum and a well filled note book.

Shushan, N. Y.

A FORGOTTEN BOTANICAL GARDEN.

BY DR. W. W. BAILEY.

THE garden laid out by Dr. Droune at Mount Hygeia, North Foster, R. I., had, in its day, a wide fame and continued for many years after his death to be a place of singular interest to professional botanists. It is a remarkable fact that over a century ago, this scholarly man, a graduate of Brown University in 1773 and a M. D. of the University of Pennsylvania should have established a botanic garden in this remote spot.

The founder's extensive circle of friends, here and abroad permitted him to amass many rare plants. These he arranged according to the accepted system of the time—no doubt the Linnaean—but with an ever present idea of harmony. It will be seen at once by everyone familiar with scientific arrangement that this must often conflict with art or taste. Within the limits of any one family there may co-exist aqueous and terrestrial plants, alpine species and others confined to valleys. In a botanic garden, then, the designer aims only at the possible. Desert plants will not co-exist with those of alluvial formations. Where water is absent in stream, pond or river certain genera and species must be omitted. A botanic garden, then becomes a compromise between accepted facts of nature on one hand and possibilities of accomplishment on the other.

The garden soon becomes known to the learned of the time and we can fancy the good doctor wandering through its paths—I had almost said aisles—with his friends. While we have no authority for the statement, and do not know who were his scientific friends, we love to think that among his visitors may have been Michaux, Nuttall, Barton and Rafinesque. We are sure he was the peer of any. He loved literature and was even devoted to poetry. Here where silence has her apotheosis, I can fancy his delight in penning the many perfumed thoughts with which his writings abound.

Dr. Droune established several squares bordered by box-wood in double lines which formed verdant paths about the garden. While large numbers of herbaceous plants have totally disappeared others still linger like "the sweet remembrance of the just." Tawny lilies (*Hemerocallis fulva*) survive, while every where black cohosh (*Cimicifuga racemosa*) lifts its spires often exceeding a man's height. The little money (*Lysimachia numularia*) "goes a long ways" and spreads all over the grounds gay with its yellow pointed stars. Here violets, now mostly wild natives, run riot in the spring and here one notes the pretty *Coronilla varia*, beds of mallow, and whole umbrella-tented armies of mandrake (*Podophyllum*). The familiar periwinkle, wrongly called myrtle, spreads even into the woods and one notes two or three specimens of dragon arum (*Arisaema dracontium*).

But what one sees in the garden here is not so interesting as what he finds in the woods. A friend of the writer, has said she is ever impressively affected at Mt. Hygeia by "the resistless onrush of Nature." A hundred years have undone about all that twenty years produced. The forest has reclaimed its own. One feels as if he stood upon an island some acres in extent against which beats, not ocean's surge, but a tumultuous crested tide of all embracing plant waves.

One's genial guide, the grandson of the founder who sleeps on yonder hillside, points out that there, perhaps, stood the orchard. Within a low fence one is shown where stood until within a very few years the original and parent "Rhode Island greening." Though it is gone the ground is still held sacred. You detect some scattered apple, pear and plum trees but the actual possessors of the ground are the forest monarchs, a giant sassafras, an old hollow chestnut, within whose hollowed bole eleven persons have gathered, noble hemlocks, and spruce, lindens, oaks, maples and hickories. Even now,

we are told, there are sixty species of trees upon the grounds and we can well believe it.

The tombstone from which the epitaph below is transcribed, is a flat slab of marble much spotted with lichen tears. It stands in the family graveyard of the Droune's at the old homestead at Foster, R. I., at the top of the hill near the road and under the shadow of three magnificent Norway spruces. A red rose blooms at the head of the grave.

EPITAPH.

SOLOMON DROWNE, M. D.

Was borne in Providence, 1753, graduated at R. I. College '73; studied medicine in Prov. and Philadelphia; commenced practice in his native place: served as surgeon in the army of the Revolution; visited the hospitals and medical schools of Europe '85; was present at the first settlement of Marietta '88; moved to Pennsylvania '92, returned to New England 1801 and settled in this place. Was appointed professor of Botany and Materia Medica in Brown University and continued the practice of medicine till his death which occurred February 5th, 1834 in his 81st year.

Dr. Droune was a member of the American Academy of Arts and Sciences, honorary member of several other learned bodies, a good scholar, a man of very extensive reading and information, a great admirer of nature, a skillful physician, a sincere patriot and an honest man.

Providence, R. I.

THE BLACKBERRY LILY.

IN a neglected fence corner of my neighbor, Robinson's orchard — a spot riotous with wilding growth —a blackberry lily has set up its home. Though it grows on another's ground, I have come to call it *my* flower,, by the time-honored right of discovery; for Robinson, thrifty farmer that he is, and engrossed in the filling of his barns, has never yet seen the lily in my plant, but only a weed.

Of a bright afternoon in latter June, I like to go with a trusty friend or two to enjoy the blooming of it. The star-like blossoms appear in a loose cluster at the top of a slender, zig-zag stem, and, being of an orange yellow color mottled with crimson purple, suggest bits of leopard skin, for which reason the plant is sometimes known as leopard flower.

If my blackberry lily were endued with the gift of speech, it would have an adventurous tale of family history to tell; for to reach America it has traveled half around the globe. It is a native of China and the far East, whence it was brought hither generations ago for cultivation in flower gardens. Being of a restless nature and finding our country entirely to its taste it soon caught the national spirit of liberty, and slipping through the garden palings became a confirmed gypsy. So nowadays we often find it encamped by many a roadside, in old fields and along fence rows, boon companion of the wildest.

But why, you naturally ask, is it called blackberry lily? September answers the riddle. Following hard upon the heels of the flower comes a pear-shaped seed vessel encased in a thin, greenish-white jacket, which the suns of summer slowly change to brown. This, about the time of the autumnal equinox, splits and falls away, leaving an oblong head of shiny black seeds exposed to view, which so much resembles a belated blackberry, ripe for the mouth, that one wonders

that the very birds are not deceived by the make-believe; for, at first sight, many a human rambler is.

Pleasant indeed are the ways of Mother Nature. Having fashioned a blackberry, soon perishable, but luscious to the palate, she makes of more enduring stuff this mock-blackberry, as though for the eye to feast upon its comeliness; for of all the spoil of the autumn fields, none keeps better for home adornment than the dried stalks and pods of the blackberry lily. When the wintry wind blows without, they are a cheerful indoor reminder of flowery slopes and meadows warm with September sun, which were and will be again.—*C. F. Saunders in The Churchman.*

COMPARISON OF THE SEASON AT CHICAGO AND URBANA, ILLINOIS.

BY FRANK C. GATES.

AT Easter this year I had a chance to compare the advancement of the season at Chicago and Urbana, Illinois. Chicago is about 136 miles north of Urbana. At Urbana the trees were partially leaved out, while at Chicago their buds were just bursting.

At Chicago there were comparatively few kinds of plants in bloom and not very many individuals of them. Those flowers that were out were not very conspicuous. At Urbana, on the other hand, there was a wealth of conspicuous beauty. Those plants that were out were in full bloom or had passed their prime. In the woods bloodroot, spring beauty, Dutchman's breeches and squirrel-corn were everywhere. The squirrel-corn in particular filled the air with its fragrance.

A comparison of our Urbana records with the conditions in Chicago shows that the season is just about ten days later there. The list which follows gives only those plants that

were in bloom in one or both places. It does not pretend to be complete, but is intended to give the predominant plants which grow in both places.

SPECIES.	URBANA.	CHICAGO.
Acer saccharinum	fruit	bloom.
Alsine media	bloom	bloom.
Amygdalus persica	bloom	not yet in bud.
Benzoin aestivale	past blooming	full bloom.
Capsella busa-pastoris	bud	bloom.
Cardamine purpurea	bloom	bloom.
Carex pennsylvanica	bud	bloom.
Claytonia virginica	past full bloom	bloom.
Dentaria laciniata	fruit	bloom.
Dicentra cucullaria	full bloom	just in bud.
Erythronium albidum	bloom	bud.
Glecoma hederacea	bloom	not yet in bud.
Isopyrum biternatum	full bloom	bloom.
Ostrya virginiana	bloom	bud.
Populus deltoides	past blooming	bloom.
Ranunculus septentrionalis	bloom	bud
Ranunculus abortivus	bloom	bud.
Salix discolor	full bloom	bloom.
Sanguinaria canadensis	past full bloom	just in bloom.
Taraxacum erythrospermum	full bloom	just in bloom.
Trillium recurvatum	bloom	bud.
Trillium declinatum	bud	just up.
Ulmus Americana	fruit	bloom.
Viola papilionacea	full bloom	just in bloom.
Xanthoxylum americanum	bloom	bloom.

ABOUT DAY LILIES.

THE various species of *Hemerocallis* are generally known as day lilies, and they are really very desirable herbaceous perennial plants with fleshy roots, graceful foliage and showy, lily-like flowers. They thrive in any rich, moist soil, in sun or partial shade, and a group of them show flowers for many weeks. As border plants they make a fine display in masses, and are much admired. Once planted they will last for years, as they are perfectly hardy and very tenacious to life.

The genus is more or less confounded with that of *Funkia,* the species of which are also known as day lilies. The two genera are, indeed, closely related, but differ in foliage, inflorescence and color—the foliage of *Hemerocallis* being narrow, stemless and channeled, while that of *Funkia* has stems, is rather broad, and shows prominent veins. The bluish and white flowers of *Funkia* are recemed, while the yellowish or orange-scarlet flowers of *Hemerocallis* are chiefly borne in terminal corymbs.

Hemerocallis alba, H. cordata, H. Japonica, and *H. plantaginea* are all names applied to *Funkia subcordata,* the common white day lily, introduced from Japan in 1830. *Hemerocallis coerula* is applied to *Funkia ovata,* with its variegated varieties, all of which throw up long, stiff stems with pendulous, bell-shaped flowers in racemes.

The chief species of *Hemerocallis* are *H. Dumortieri,* from Eastern Siberia, growing 18 inches high, and bearing clusters of from two to four brownish orange flowers early in summer. The foliage is dense, narrow, arched and graceful, and a fine back-ground for the many flower clusters. It is often called *H. rutilans, H. Sieboldii* and *H. minor. H. flava* is the well-known lemon lily. It throws up stems 2½ feet high, bearing late in May, large clusters of lovely, fragrant,

clear, yellow flowers at the summit; leaves long, narrow and handsome. A beautiful species from Siberia and Japan.

H. fulva is the old garden day lily. It grows two feet high, and has, during summer, clusters of large, showy, tawny flowers. It thrives in any situation, and is found in nearly all the older gardens. It is sometimes known as *H. disticha,* and a double-flowered variety is catalogued as *H. Kwanso.* There is also a variety with variegated foliage.

A species much like *H. flava* is *H. Middendorfii,* but grows taller and blooms later. It is a beautiful sort from Siberia and Japan, and deserves popularity.

H. aurantiaca major, a new sort from Japan has splendid orange-yellow flowers rivaling the *Amaryllis* in size and delicate texture. The plant is more delicate than the others, and does not always retain its place in the garden when placed there.

All these day lilies can be advantageously used in ornamental gardening. The variegated *Funkias* and *Hemerocallis Dumortieri* are good for edgings, and the taller kinds for the back ground or for borders or groups. The flowers last but a day, but new buds open in the morning, and thus the display is prolonged. They are, of course not useful for cutting, except for immediate effect.—*Park's Floral Magazine.*

THE LIGNON BERRY.—Regarding the identity of this berry for which an inquiry was made in a recent number of this magazine, Mr. O. M. Oleson, of Fort Dodge, Iowa, writes that it is the fruit of an Old World heath, *Vaccinium Vitis Idaea.* It is sometimes called red whortleberry and cowberry, and belongs to the same genus as our familiar blue-berries. The plant is also reported in this country from the summits of the white mountains, but the berries that come to our market are grown in Europe.

NOTE AND COMMENT

Wanted.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their shorter botanical items. The magazine is issued as soon as possible after the 10th of February, May, August and November.

Water Storage in Plants.—A large number of species representing a score of the great natural orders of plants exhibit a strongly developed capacity for the storage and retention of surplus water in specially developed tissues of the stem, root, branches or leaves. While this feature is exhibited most abundantly by plants of arid regions in which the rainfall comes within a brief season, yet it is found in a goodly number in moist tropical jungles and caution in designating it as a direct adaptation seems desirable. Before much progress can be made in the analysis of the storage function it will be necessary to come at the chemical mechanisms by which it is made possible together with the environmental forces which incite or inhibit it.—*Dr. D. T. MacDougal in Plant World.*

Color Variations in Plants.—A number of articles and notes on color variations have appeared in this magazine and the titles are given below. The numbers following the titles refer to the volume and page, the volume number being separated from the page number by a colon. Correlation of color 8:115, 10:16. The colors of Northern flowers 8:41, color changes in individual flowers 7:83, color of the meadow lily 9:54, 76, 92. Albino flowers 3:115, white flowers 9:34, Warning colors of flowers 11:118, crimson-eyed swamp mallow 11:90. The white marsh mallow 7:95. Variation in

Rudbeckia 11:89. Scarlet flowers and drouth 12:68. The yellow fringed orchis 11:45, cream colored jewel weeds 7:29, 66. Color of flowers and locality 9:76. A yellow trillium 12:83. Color variations in a common trillium 11:16. Temperature and the color of lilacs 5:78. Drouth and the color of clover 5:36 viola selkirkii 11:17. Blue hydrangeas 4:15. Locality and the color of flowers, 8:93. Change of color in flowers, 8:116, more red flowers 7:54, color 8:91. Any single volume may be had for 50 cents or for 40 cents when ordered with a year's subscription. The numbers are not sold singly. Prices of complete sets may be found in the advertising pages or will be sent upon application. Lists of other titles appear in earlier numbers.

Canada Thistles and the Law.—The Canada thistle, (*Cnicus arvensis*) which, by the way, is not indiginous to Canada at all but comes to us, like so many of our vile weeds from Europe, is justly considered one of the greatest nuisances with which the farmer has to contend and several states have enacted laws which impose severe penalties upon any person allowing these plants to go to seed upon his premises. No little confusion exists, however, as to the best way of eradicating these weeds when they once gain a foot-hold. Farmers, in general seem to think that an application of a heavy dose of salt is the only effective method while a few claim that salt acts only as a fertilizer to them. It is strange that notwithstanding their familiarity with growing things very few farmers seem to realize that any green plant may be killed by simply cutting off its leaves and allowing no more to form. Canada thistles are as easily killed by this method as any other plant, though owing to the amount of food stored in their underground parts, it may require several cuttings of the leaves to finish the job. It is often stated that the Canada thistle does not mature its seeds in the southern parts of its range, but this is a mistake founded upon a misunderstand-

ing of the plants' structure. The fact is this thistle is dioecious, that is the staminate and pistillate flowers are borne in separate heads. Only the pistillate flowers produce seeds, so that anyone happening to examine the staminate flower-head world hastily conclude that the plant was not producing seeds. There is a noticeable difference in the shape of the two kinds of flower-heads, the staminate being rather longer than the other. Rarely the heads are incompletely dioecious and have the two kinds of flowers mixed in the same head.

Origin of Thorns.—It seems to be tacitly assumed by the majority of writers that the changes undergone by a mesophytic species when grown in an arid situation are of such nature as to fit the the individual better for living under the drier conditions. This does not always follow. The form assumed by a shoot in a dry atmosphere is the result of growth conditions established by the balance among the absorbing organs, the conducting stems and the transpiratory surfaces. * * * Not only are the responses of plants to environmental forces not necessarily of an adaptive character, but it is impossible to derive some of the most highly specialized and heritable structures from the supposedly causal conditions which they meet. Spines and spiculate do lessen the ravages of grazing animals upon cacti to some extent, but these structures are undoubtedly a direct and accumulated response to aridity or poverty of available water, and in a dozen species the deterioration of leaves and branches has been carried so much further that we have many spineless or nearly unarmed forms in American deserts which suffer variously or not at all from animals. * * * The entire matter rests upon the fact that when a stimulus, consisting of a change in intensity, light, soil solutions or humidity is brought to bear on a plant it responds as a living machine.—*Dr. D. T. MacDougal in Plant World.*

Ivy Poisoning.—Mr. O. M. Oleson notes that a cheap and ready remedy for poisoning by *Rhus toxicodendron* is to wash the hands or exposed parts with hot water and soap. The poison is supposed to be due to a non-volatile oil, toxicodendrol and the hot water and soap will remove the poisonous effect if applied the same day. Washing in cold water only makes it worse.

Sphagum and Peat.—The mosses of the genus *Sphagnum* are commonly called peat mosses from the supposition that they have been mainly concerned in the formation of peat bogs. Recent investigations, however, indicate that these mosses have less to do with forming peat than geologists have asserted. One of the sedges, *Carex filiformis,* is now said to be the principal former of the sedge mat which ultimately becomes the basis for a layer of peat. It has also been recently reported that some of the salt marshes along the Atlantic coast are underlaid by a stratum of peat formed from fresh-water plants. This throws an interesting light on the elevation and subsidence of our coasts.

Plants that Seldom Fruit.—Among the plants that seldom fruit, at least here in New England, is the *Epigaea repens,* our familiar May-flower or trailing arbutus. At one time I recall Dr. Asa Gray's advertising for it· I, myself, have seen it but once and that high up on the Northwest slope of Mt. Wachusett. The plants in that locality were especially vigorous as evinced by the large leaves and dense, wide-spreading patches. It is well-known that the flowers are dimorphic so there is an evident provision to have them fructify at least occasionally.—*Dr. W. W. Bailey, Providence, R. I.* [It may be questioned whether the trailing arbutus is really one of the plants that seldom fruit, if undisturbed by man. In the vicinity of cities and towns it is so closely gathered that it does not have much of an opportunity to show what

it can do. The editor has usually been able to find seed where the plants grow in remote woodlands. This is the time of year when everyone can aid in settling the question. Does *Epigaea repens* usually fruit when undisturbed or is its dimorphic flowers a hindrance to this process. Who will inform us?—Ed.]

Elder Seedlings.—It is a general rule in nature, to which there are various exceptions, of course, that plants which have efficient means of multiplication by vegetative shoots, seldom produce fruit. This does not mean that they cannot produce fruti but that they seldom do so. In some cases it is quite possible that fruit is not produced because the proper insects did not pollinate the flowers, or because a frost killed the pistils, or from other causes, yet the fact remains that some plants do not readily produce seeds under what appear to be the most favorable circumstances. Such plants usually have other means of multiplying as illustrated in the common potato. The elder (*Sanbucus Canadensis*), however, is not one of this number. Although it yields to none in the rapidity with which its underground shoots take possession of new territory when once it obtains root-hold, it is the equal of any in the number of fruits it produces and the seeds are strong and vigorous. A very high per cent will grow if properly planted as has been proven by recent trials in the grounds of the editor.

The Struggle for Existence.—The effect of some seemingly insignificant feature of a plant upon its success or failure in life is often remarkable. A millimeter or two in the length of the red-clover's corolla is sufficient to keep out the honey-bee with a consequent loss of pollination, seed production and plant distribution; the possession of a root or root-stock filled with plant food often determines the struggle between two plant colonists of a region, and so on. A writer

in a recent magazine shows how the presence of certain birds in the desert serves to limit the spread of the giant cactus (*Cereus giganteus*) because of its structure. Not only do the birds eat great numbers of the seeds of this plant, but the young seedlings from such seeds as escape the birds are greedily picked up because the swollen caulicle or hypocotyl contains considerable water. These seedlings are found in dry seasons after the rains have ceased and form practically the only available supply of water for birds and other small animals. Thus it turns out that a device of the plant looking toward its self-preservation in a dry time is one of the most harmful since it leads to the direct undoing of the species.

Sesquipedalian Plant Names.—It is believed in some unsophisticated quarters that plants are given names to facilitate their use in botanical writing, but the elect know better. Half the enjoyment that some people get out of botany would be taken away if plants were named strictly with that end in view. Along with Byron these people appear inclined to repeat "Tis pleasant, sure, to see one's name in print" and they act upon the motto by attaching as many of their own names as possible to a plant as a sort of monument to themselves forgetful of the proverb that "no man who needs a monument deserves to have one." These thoughts come to mind upon reading the citation of a large form of the common white water-lily. In full it is *Castalia odorata* (Aiton) Woodville and wood, variety *gigantea* (Tricker) Fernald. Here are ten words to express unusual size in a plant, but in our opinion the specimen would have to be a very Goliath, indeed to deserve so sizeable a name. Analyzing the title a bit, however, we see that of these ten words, the plant has only three for itself. while no less than five eminent scientists have got into the combination. This seems a trifle unfair to the plant. But let no one assume that the instance we have cited is an extreme

case for here and now we purpose showing that it is not, by citing from the same article another still longer, namely *Rubus Idaeus* Linnaeus, variety *acculeatissimus* Regel and Tilling forma *albus* (Fuller) Fernald.

Origin of Flowering Plants.—In a general way it is known that flowering plants have arisen from fern-like plants just as the ferns themselves, are known to have originated from still lower orders of plant life, but the exact line by which the flowering plants descended from lower plants is shrouded in shadows which continued study may never entirely dispel. There is a considerable gap between ferns and the higher plants which may have one day been filled by species of fern-like flowering plants which are now extinct or found only in a fossil condition. Many botanists see in the fruiting spikes of *Selaginella,* the cones of the pine, the catkins of the willow and other amentaceous trees and the cone-like carpel-clusters of the magnolias, evidences of a line of evolution, but other botanists, equally eminent, regard the pines, willows and their allies as reduced descendants of other families and would derive the flowering plants directly from some *Cycas*-like gymnosperm through the magnolia and its allies. Superficially the flowers of the magnolia are much like those of *Cycas,* with the exception of course, that in the magnolia the seeds are enclosed in the carpels while in *Cycas* they are not, and the latter also lacks petals. Petals, however, were doubtless once merely sterile carpels or stamens.

The Waning Hardwood Supply.—In former days, certain desirable kinds of lumber were so cheap and abundant that it did not pay to saw certain inferior kinds of woods. The increasing demand for hardwoods that is being made upon our forests has brought even these less desirable woods upon the market, often at prices higher than was formerly paid for the best grades of better lumber. The principal uses for hard-

wood lumber are found in the manufacture of furniture, cooperage, musical instruments, vehicles, agricultural implements, car building and house finishing. Of the woods in greatest demand, oak is easily the leader. It is in great demand for furniture and the interior finish of cars and houses. Hickory is most used by the makers of vehicles and agricultural implements, though other woods are also used. Oak is also indispensible for tight cooperage, but elm is depended upon for slack cooperage, that is packages that do not need to hold liquids. Some of the woods which a shortage of the best grades is bringing upon the market are tupelo (*Nyssa*) red gum (*Liquidambar*) beech, cottonwood and sycamore, and even these are fast disappearing. Unless we soon provide means to continue our supply of timber it looks as if the next generation will have to do without wood.

A Visitor from California.—Last summer a strange-looking plant appeared along the Illinois Central railroad tracks at Rantoul, Illinois. Its small yellow flowers showed that it belonged to the Borage family, where our heliotropes and bluebells are also placed, but it was totally unlike any of the plants described in our manuals. Finally it was found to be *Amsinckia intermedia,* a plant which apparently has no common name, and is a native of the coast of California. Of course the seeds of the plant, in making this long journey, were caried in a freight car, but just how one can not find out. It would be interesting to know the exact source of the plant, and to follow it step by step through the many hundred miles of its wanderings until at last it reached the earth and grew here in Illinois.

FIELD BOTANY

Edited by Dr. H. A. Gleason, Urbana, Ill.

One of the most attractive of our spring flowers in the Middle West is the blue-eyed Mary, or *Collinsia verna*. It does not seem to be a very common plant, but is usually quite abundant wherever found. It is a small plant, rarely exceeding a foot in height, and produces at the top of the stem a cluster of delicate flowers, which are half blue and half white. The plants usually grow in compact colonies, and in this way can display a wealth of color which is rivalled only by the wild sweet-williams. The flowers are visited by large numbers of insects, and one can easily observe the interesting mechanism by which the insects are dusted with pollen. At first sight the flower apparently consists of four petals, but when the insect alights on the flower the lower two petals give way, and the stamens loaded with yellow pollen come up mysteriously from below. They have been hidden within the fifth petal, which is at other times out of sight. It is located just between the two lower blue petals, but is folded down the middle into a pocket containing the stamens. The weight of the insect visitor causes the blue half of the flower to bend down, the fifth petal partially unfolds, and the stamens protrude, ready to dust the insect with the pollen, which can then be carried to another flower.

Blue-eyed Mary is an annual plant, that is, it comes up each spring from seeds produced during the preceding summer. Evidently if no flowers are allowed to go to seed there will be no flowers during the following year. Therefore if you want blue-eyed Marys next year, you must spare some of them now. I know of localities where the whole supply might easily

be exhausted in a year by wild-flower gatherers, and the woods would lose one of their chief spring attractions forever, just to gratify some thoughtless person for a day or two, or until the flowers wilted. Enjoy the flowers in the woods, where they are the prettiest and the most attractive, but if you think you must take them home, be content with a moderate number.

Prof. Bailey's interesting note, printed below, on the profuse blooming of sugar maple this year is just in line with the notes on another page concerning squirrel-corn. In central Illinois the maple has bloomed no more freely than in other years. Possibly some local peculiarity of the climate may wholly or partially explain it.

Everyone knows that fruit-trees, especially, enjoy alternate years of profuse bloom. Hence, with apple-trees the familiar terms "off" and "on" years. As a rule, I think the forest trees are much less subject to these alterations but for many years I have observed them as a marked feature in the life of sugar maples. It so happens that this beautiful tree is a great favorite of mine so that every year I look for its dainty dream-like flowers and often are disappointed. This year, however, is an "on" one with my friend and I think I rarely if ever saw it so abundantly clothed with blossoms. All the specimens I have seen, and there are many growing in the streets as shade trees, are alike in this prolific exhibition. To stand beneath one of these maples in flower is a liberal education. It seems like some vast fountain bestowing upon us a benison of gold. Of course one naturally expects, as a result of the unusual fecundity this year, a corresponding dearth of blossoms another. One is led to marvel how these alternations come about, and why all the trees of a species simultaneously exhibit the phenomenon.

Again, can the alternations be made less pronounced, or even broken up, by destroying a majority of the flowers in

some given year? I presume this has been tried with fruit-trees. Side by side with the sugar maples are seen, year after year, the exquisite Norway species each season blooming super-abundantly. But all maples as regards their reproductive functions appear to be in a state of flux. Normally polygamous, I have known certain trees of red maple and of Norway, strictly either staminate or pistillate during many years acquaintance. Are they striving for stricter separation or, on the other hand, towards hermaphrodite conditions.—*Dr. Wm. Whitman Bailey.*

Spring and early summer are the seasons when everyone that can, goes strolling in the woods and brings home bouquets of wild flowers. As a result, near most of our cities the supply of wild flowers is almost exhausted. In some woods near my home the bloodroot, rue anemone, trillium, columbine and dog-tooth-violet have all disappeared within the last ten years, and the last colony of shooting-star was uprooted in 1899. Many plants can not withstand the repeated loss of flowers and the consequent lack of seeds. Others like the *Trillium,* are killed because the leaves are all taken with the flowers and the plant can no longer manufacture its necessary food. Some stemless plants, like the common blue violets, are not at all injured by plucking the flowers, since the leaves are spared and the small cleistogamous flowers later in the season produce most of the seeds. The larger and coarser plants of summer and autumn are also less liable to injury from careless flower-gatherers. Let us, as lovers of plants, use due discretion in gathering flowers, so that there may be a perpetual supply of them for others to enjoy as well as ourselves.

EDITORIAL

Dr. Gleason's article on "Resting Plants," in this issue, touches upon a subject that has been but little investigated, but which should yield some interesting results to the student who will take it up. It is to be hoped that all who have other instances of this kind will send them to Dr. Gleason. In reference to the blooming of squirrel corn in the region in which this magazine is published, it may be said that while we have not particularly noted its abundance in previous years, the spring of 1908 was remarkable for its profuse blooming. The editor has seen acres of ground that were literally white with its graceful flowers. With us it is often called white bleeding heart.

* * *

When in 1902, the Lloyd Brothers of Cincinati erected in that city a four story building of brick and stone for the housing of their immense collections of books and botanical specimens, the fact was hailed as an example of a most unusual interest in science by men of wealth. The Lloyds, however, were not building for the public but having completed the structure, continued to add to the collections installed in it. Soon this large building became crowded and last winter another four story structure was completed. In this second building the books on Botany, Pharmacy and Medicine will be housed while the first one will continue to accomodate the vast collections of fungi. Some idea of the importance of these two buildings and their contents may be had when it is known that in the library building there is more than two miles of shelving for books and nearly twenty-five thousand volumes in place. About a hundred thousand volumes can be sheltered here. The museum building has thirty thousand specimens of flowering plants, but its chief glory is its collect-

ions of fungi which are exceedingly rich and varied. In the puff-balls and their allies alone, there are ten times as many specimens as there are in all the other museums in the world *combined*. Mr. C. G. Lloyd is recognized as the highest American authority in regard to puff-balls, etc., and is fast pushing to the front as an authority in other groups of fungi. This is not a little due to his original ways of looking at the subject. Instead of sitting down in a museum and drawing up, from dried specimens, still drier descriptions, he has searched a great part of the world for living specimens. His knowledge of the European species with which our own are so often compared, has been obtained at first hand, and his judgment in consequence is likely to be sound. May he have the full success his energy and ability merit.

* * *

The editor of *Muhlenbergia* is outspoken and emphatic in his objection to that clause of the Vienna rules which requires that all new species shall now be described in Latin and in this he apparently voices the sentiments of most of those who follow the "American code." "Writing about our plants in an alien tongue," he says, "will not advance the work." There are, however, certain contingencies doubtless over looked by *Muhlenbergia's* sapient editor, in which he might devoutly pray for the very thing he now rails against. For instance, in the region covered by *Muhlenbergia* there is an ever-increasing number of Japanese, not a few of whom may elect to take up botany bringing to bear upon that subject the same industry and patience that have made them successful in other walks of life. Finding various species unknown to science there is nothing in the "American code" to prevent their describing them in the Japanese *Botanical Magazine* in paint-brush characters that will puzzle more occidentals than the worst dog-Latin could possibly do. What shall then be done? Will the

sponsors of the "American code" issue a new clause requiring that everybody forget that the Japanese and their language exist? Would it not be more sensible to adopt a language, such as the Latin, that does not change and write, just as the rest of the world has agreed to do, all new descriptions in it? Theoretically the editor of AMERICAN BOTANIST is strongly in favor of having all descriptions in Latin; practically he has continued to describe new species in English. He does not fail to perceive, however, that if all the Russian, French, German, Italian and Japanese botanists who are now describing plants agree to write descriptions in Latin, he will have to understand only one language besides his own, instead of half a dozen as formerly in order to keep in touch with the botany of the world and he hopes in time to convert *Muhlenbergia* to his view of the case.

* * *

The third International Botanical Congress will be held at Brussels from May 14th to May 22nd, 1910. The second Congress, held at Vienna in 1905 drew up a set of rules of botanical nomenclature since known as the Vienna Code, but these rules were mostly made for flowering plants, though some apply to other groups. Various special questions, relating to cryptogams still remain to be settled, and these will be discussed at the coming meeting. The committee on Cryptogamic Nomenclature consists of eminent cryptogamic botanists from all parts of the world and the nomenclature of these groups now bids fair to be placed upon a stable basis. A list of "nomina conservanda," or names which are not to be affected by rules of "priority," is suggested for each group, including the ferns and their allies. We who are more interested in the plants themselves, than in their names, hope the nomina conservanda will be as large as possible. Some four hundred generic names were thus reserved among the flowering plants.

BOOKS AND WRITERS.

There is something about Clarence M. Weed's "Wild Flower Families" that reminds one of Mrs. Dana's "According to Season," yet the books are not at all alike. Mr. Weed's book is designed as a sort of supplementary reader for schools, having at the end of each chapter a list of questions which students are expected to answer in note books provided for the purpose. In the hands of live teachers with time for trips to the woods and fields with their classes it should prove a most effective means of interesting pupils in out-door life. As the title of the book indicates, the plants are discussed according to their natural relationships, but owing to the limited space only a small number from each plant family can be discussed. These, however, are the showiest members of each family and the ones children are likeliest to notice. The text is concerned with information regarding distribution, pollination, structure of the flower, ect., with considerable poetry and folk-lore added. Numerous illustrations add to the value of the text. The book is a small 12 mo. of about 250 pages, and is published by the J. B. Lippincott Co., Philadelphia.

"The Nature and Development of Plants" by Dr. Carlton C. Curtis is a new presentation of an old and well-known subject. The present volume is designed by the author to give some information about plants before the more careful study in the lecture-room and laboratory is taken up. Accordingly the first four chapters are devoted to a discussion of the structure and life process of plants, the remainder of the work dealing with their development and classification. The text is clearly written and seems calculated to carry out the end the author had in view, but the mechanical part of the book cannot be so highly commended. While clearly printed, there are many errors in typography, and cuts are transposed or wrongly numbered, for all of which of course the author is

not to be blamed. We cannot help regretting the use of such clumsy and inappropriate terms as "Horsetail Ferns" and "Club-moss Ferns" while the introduction of the word gametospore to indicate the sexual spore seems to the reviewer an over refinement. Notwithstanding these minor defects, the book is a lucid account of the subject and will no doubt do its full share in making clear the difficulties that hedge round this phase of botany. The book is an octavo of 475 pages and nearly 350 illustrations and is published by Henry Holt & Co., New York.

If any teacher among our readers has not yet seen *The Western Teacher*, of Milwaukee, Wis., he would do well to send for a copy. The editor has a straightforward way of dealing with things educational that is particularly refreshing. The magazine is an inspiration to all who are working for better methods in teaching. If we did not get *The Western Teacher* in exchange we should subscribe for it, and that is about the best endorsement an editor ever makes. The subscription price is $1.00 a year. New subscribers may club it with *American Botanist* for $1.50.

Dr. William Ashbrook Kellerman, widely known as an earnest investigator and facile writer on botanical subjects died after a brief illness, March 8, 1908, at Zacapa, Guatamala, whither he had gone with a party of students for botanical studies. Dr. Kellerman was especially interested in mycology and edited both the *Journal of Mycology* and *The Mycological Bulletin*. The April number of the first mentioned publication states that the future of the magazine is in doubt. It is hoped that someone can be found to carry on the work so ably begun by Dr. Kellerman.

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CONTENTS

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"*A man shall perhaps rush by and trample down plants as high as his head, and cannot be said to know that they exist, though he may have cut many tons of them, littered his stables with them, and fed them to his cattle for years. Yet, if he ever favorably attends to them, he may be overcome by their beauty.*" —Thoreau.

THOREAU'S COVE.

By Willard N. Clute.

It is just possible that the name of Henry D. Thoreau is a name, only, to many of the rising generation of naturalists, but to those who are familiar with the literature of the outdoor world, it will ever stand for a unique and interesting figure among students of nature. Thoreau practically devoted his entire life to a communion with nature following his chosen bent with a zeal and ethusiasm never equalled before or since. A thinker of much depth, contemporary and friend of Alcott, Hawthorne, Emerson, Channing and other eminent men, he gave a new fame to an already famous town, and has left an impress upon the natural history of New England akin to that which Gilbert White left upon Old England, but far deeper and richer in effect He never married, preferred solitude to company, and satisfying his few wants with the money earned by occasional lectures, and by odd jobs of surveying for the surrounding countryside, he was free to devote himself to the contemplation of nature

Thoreau was born in Concord, Mass., July 12, 1817 and spent most of his life in his native town. In 1845 he built with his own hands a small frame house on the shore of Walden

Pond and lived there by himself for more than two years. It was here he wrote his first and most famous book which he named "Walden," and here, also, was undoubtedly carried on much of the writing of his "Week on the Concord and Merrimac Rivers." Concerning the location of his house, he says in "Walden:" "Near the end of March 1845 I borrowed an axe and went down to the woods by Walden Pond nearest to where I intended to build my house and began to cut down some tall arrowy white pines, still in their youth, for timber. It was a pleasant hillside where I worked, covered with pine woods through which I looked out on the pond and a small open field in the woods where pines and hickories were springing up" As to his reasons for taking up his residence here he says in another place, "I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it has to teach and not, when I came to die, discover that I had not lived."

After he abandoned his house it was taken by a Scotch gardener who moved it some rods away into Thoreau's bean-field. A few years later it was carried three miles northward where it stood until after Thoreau's death On the title-page of the first edition of "Walden" there is a cut of the house from a drawing made by Thoreau's sister Sophia but, according to Sanborn, the biographer of Thoreau, the trees are not accurately drawn.

On the spot where Thoreau's house first stood there is now a cairn of stones which is constantly increasing in size as each pilgrim to the spot adds a stone from the shore to the pile. An illustration of this interesting spot is given in the frontispiece of this issue. It was made from a photograph taken by the botanist Alfred W. Hosmer and selected for the editor by Prof. J. Y. Bergen, author of the well-known botanical texts. On the back of the photograph, probably in Hosmer's handwriting is the title "Thoreau's Cove, Walden."

The best-known of Thoreau's works are the two books already mentioned. Others are "The Maine Woods," "Cape Cod," "A Yankee in Canada" and "Excursions." Several others have been issued since his death, compiled from the voluminous journals which he kept for many years. Those who have not dipped into them, would do well to try "Walden." In passing it may be mentioned that the herbarium of Thoreau is deposited in the public library at Concord where it may be seen by those who so desire.

TRICKY PLANTS.

By Dr. W. W. Bailey.

WE are so much in the habit of conceiving plants as modest and guileless; fair and innocent, that we experience a shock when we learn that less moral kinds exist. Some, indeed are most ingenious deceivers at times fooling even the alert human observer. In this matter they mainly hold two purposes in view, either to entice insects to the flowers as pollen carriers, or to entrap them for animal food.

From the earliest days of Botany, it has been known to everyone that the round-leaved Sun-dew (*Drosera rotundifolia*) catches ants, flies and other small insects. In an excursion made a few years ago to the upper part of this state, with Rev. Robert Cheney, then Rector of Pascoug—a gentle enthusiast, he found a specimen of sundew holding fast by two leaves to a grasshopper. I tried to carry traps and victim home, but mere shaking about in my tin box released the poor hopper, to his joy and my unholy sorrow. Let us see how this plant acts as a trap. Only a few inches in height, it possesses a radical cluster or rosette of curious leaves, the blade of each leaf is circular and about the circumference of an old three-cent silver coin. It is bestudded all over with long hairs, which Darwin aptly called "tentacles" from their resemblance to

the feelers of certain insects. "Each tentacle is capped by a globular disk, which exudes a sticky substance, brightly glistening in sunlight. Hence the pretty name of the plant. The scientific name is from the Greek—*droseros,* dewy—so the naturalist and the mere plantlover both recognize its peculiarity.

Under normal conditions the leaf has a flat or merely depressed surface. If a minute insect alights upon it, very shortly the tentacles nearest him curl over, hold him and exude more secretion. More and more tentacles become involved and the creature is gradually passed to the center of the leaf. The blade then becomes depressed or hollowed like a basin. The struggling animal is held tight, and is more and more bathed in a juice now known to be closely comparable to the gastric juice of animals. The intruder is, indeed, with the exception of chitonous or hard parts, like wings or the elytra of beetles, completely assimilated.

Darwin, who made an exhaustive study of sundew, and whose observations have been confirmed by many others, tried feeding the plant on various substances. It responded to all nitrogenous matters—flesh, cheese, etc. but was inert to powdered chalk and the like. With cheese it indulged in an orgy suffered righteously from dyspepsia, withered and died.

In the United States besides the round-leaved, we have other species. In Rhode Island there are two, and there is no sufficient reasons why another, the red-flowered *D. filiformis* with long thread-like leaves tentacled throughout their length, should not yet turn up in South Co. or in Little Compton. It occurs on the Cape, so near us and under our own sort of environment, that one might fairly expect it.

Providence, R. I.

STUDYING THE WILD FLOWERS.

By L. E. Hurst.

MY own inherent love of flowers has led me on many a long and weary tramp, in search of woodland beauties; and as far as my ability permitted, I have studied and analyzed those flowers which are found in our neighboring fields and woods When I first began the study of botany, I deemed it necessary to press at least one specimen of every kind; but the last few years I have learned a better way to preserve the form and beauty of these fragile woodlings, and that is by means of the camera, the brush and the pencil. The pressed specimen is at best a poor representation of the grace and beauty of the natural flower; it is merely the husk, out of which the life and sweetness of spring have forever been crushed.

Another way, in which I enjoy the wild flowers, is by transplanting them to my garden. There, without trouble or inconvenience, I can watch the procession ofSpring. The place where they thrive best is under an osage hedge, where the fall winds cover them with leaves, making a warm blanket which the thorny branches hold in place. This space, however, is inadequate to meet the demands of my ambition, so I have chosen a shady nook beneath some trees, and already have quite a collection. The ground itself is sand, tho moist and rich, and to this I have added a quantity of well-rotted wood, spading it in as much as posible. The plants certainly respond well to this treatment, rewarding me every spring with a mass of bloom. When one has the space, this way, perhaps, yields the most enjoyment, tho the pictures furnish us with the image long after the flower itself has withered and died.

Avon, O.

NOTES ON THE ACADIAN FLORA.

By Mrs. Cora E. Pease.

WHILE on a recent trip to Evangeline Land, Nova Scotia, I noted a very interesting flora having many species of a more northern range than the familiar plants of eastern Massachusetts; yet I came upon many things that I should expect to find farther south. For instance, the dainty creeping snow-berry, or tea-berry, as my friends in Nova Scotia called it, the rarely beautiful *Oxalis acetosella*, and the lovely twin-flower, grows in bogs not far removed from dry sandy plains carpeted with the golden flowered heath-like *Hudsonia ericoides*. The white and the purple fringed orchis, also the *Habenaria tridentata* are very abundant, and less common is the handsome yellow fringed orchis. *Robinia viscosa* flourishes as an ornamental tree, and, in many instances, like the common locust, had escaped from cultivation.

As in the forests of Maine, the woods in the valley of the Cornwallis River have an abundant undergrowth of the striped maple, or moosewood, and the *Viburnum lantanoides*, in some localities also called moosewood on account of the moose feeding upon the large leaves and tips of branches.

I do not recall but a few plants I had never seen before. Among them are the American yew, or ground hemlock, sparsely ornamented with its glistening red berries; the water-starwort, *Callitriche verna*, of fascinating interest as it floated in the shallow water of the river in company with the long streamers of the white water crowfoot; and the least yellow pond lily, *Nuphar pumilum*, growing above the mill-dam in the back water of the same river. The flowers were scarcely larger than one's finger nail. This seemed to be the common *Nuphar* of the region for I never once saw there our everywhere present *Advena*.

Many species of ferns grow most prolifically, and I noticed as common, what I never see about our own woods and pas-

tures, the beech ferns, *Phegopteris polypodiodes* and *dryopteris* and *Aspidium spinulosum* and *cristatum*,—one species of the latter with a forked frond.

It would take too much space to enumerate half the interesting things I noticed particularly in the Acadian flora, but I must not omit to mention a potted plant called the "Grand Pre fern," I was shown just as I was about to return to Boston. This specimen they told me, came from a greenhouse, but I was assured by several persons that the same fern grows wild about ten miles from Grand Pre in the Gaspereaux Valley. The fern resembles *Adiantum capillus-veneris*, but varies much from this species as I had seen it growing in greenhouses and in the tropics. The fronds are longer, narrower, and more tapering; the rachis is larger and more sweeping; and the pinnules are smaller and thinner in texture; the whole plant suggesting a fern less robust and more graceful than *Capillus-veneris*.

I very much doubt that a fern of known tropical habitat could be found, even in the most sheltered valleys, so far north as Nova Scotia. I know that in "Our ferns in their Haunts" it is reported as occuring in the Black Hills of South Dakota, but the temperature of this locality is warmed by hot springs. Also there is doubtful authority for its growing in New York and Pennsylvania.

Is it possible that a form of the *A. capillus-veneris* grows in the Gaspereaux Valley, as several witnesses testify? Or is the "Grand Pre fern" our common *A. pedatum*, and have my informants, not being particularly skilled in fern knowledge, confused the two forms? My curiosity about this fern was so great that, had circumstances permitted, I would have continued my journey into the Gaspereaux Valley, and searched for the wonderful Grand Pre fern until I had found it and established its identity beyond question.

Malden, Mass.

ARCEUTHOBIUM IN WISCONSIN.

By S C. Wadmond.

FOR years, the writer has had a speaking acquaintance with the so-called "witches' brooms" on Coniferous trees, but had never felt much interested in them from the standpoint of a student of phanerogams. Last year, however, (1907) we spent a week in the vicinity of Gordon, Douglas Co., in the extreme northwesterly corner of Wisconsin, in company with Dr. J. J. Davis of Racine, who was making a special search for the various species of fungal growths which cause these curious deformations.

One morning we had worked our way into a black spruce swamp, the Doctor examining such witches' brooms as were at all accessible. One "broom" in particular hung temptingly on a small spruce, and it was an easy task to bend the tree down sufficiently to examine the bunches of closely packed, slender branches, quite resembling a broom made of twigs.

At first glance, and without the magnifier, it seemed to be affected by the same fungus which Dr. Davis had observed and collected on other witches' brooms earlier in the week, and he called the writer's attention to what seemed to be a swelling of the tissues, and the formation of a great number of little vegetative bodies, magenta-red in color, and proliferous, on the portion of the broom which showed living twigs. A closer examination, however, under the magnifier, made us quite certain that we had in hand, not a parisitic fungus, but a parasitic phanerogam, and if the latter, we knew it must be *Arceuthobium* which both of us knew from herbarium specimens, although neither of us had ever seen it in the field. I was just that certain of it that I took enough material to almost glut my collecting case. We needed only to get back to our hotel and consult our Illustrated Flora to know absolutely that we had found the little mistletoe *Arceuthobium pusillum,* a noteworthy find, not only because it added a new and extremely rare and

local species to the known flora of Wisconsin, but because it extended the range of the species westward almost a thousand miles, its westerly limit being set in the Manuals at the Pocono Mts. of Pennsylvania.

Before we left Douglas Co., I examined many another witches' broom for *Arceuthobium,* but in every case with negative results. I am very thankful that I had a mycologist for a companion that morning.

Delevan, Wis.

FOREIGNERS ON THE FARM.

THE wild blossoms of the old farms where we go to spend our summer vacations are very different today from those that beautified the land two hundred years ago when our ancestors settled it. As their plows turned up the flowery sod to make a loamy bed for their cultivated crops, the native plants were driven every year further into the wilderness, until now as we sit in our easy chairs and look out upon waving fields of grain and grass we have small conception of that wild charm of fragrant, blossoming glades and meadows that so delighted the early explorers

Of the myriads of lilies, irises, wild peas, roses, painted cups, violets, cranes-bills, anemones, meadow rues, polygalas, gentians phloxes, asters, goldenrods, and orchids that nature prodigally planted where the farms of our Atlantic seaboard now are, not a thousandth part remains today, and these only by sufferance along neglected fence-rows or in bits of long-hoarded woodland.

In their stead, following in the wake of the devouring plow, has come up a host of foreigners—plants from over the sea, their seeds brought hither mingled with garden seeds or in ship's ballast, or clinging like the vegetable tramps they are to the wrappings of merchandise

Among these is the common plantain, which the Indians called "white man's foot," because it followed so closely in his track. Daisies, dandelions, and buttercups too, have all come to our shores with the tide of human immigration from the Old World, the last named being one and the same with the king cups of the poet Spenser and Izaak Walton. Wild carrot too, that ubiquitous weed of neglected fields, is from abroad. There two or three centuries ago it was moving in aristocratic circles, its fernlike foliage being popular with ladies of kings' courts as an adornment. The memory of that high estate still lingers in another of the plant's common names —Queen Anne's lace.

Another foreigner all too common in our fields is the black-dotted, yellow-flowered St. John's wort, which has come to us clothed in Old World superstition. It is one of those plants which in the Middle Ages were sacred to John the Baptist, and in monkish Latin was called *fuga daemonum*—"demon's flight." On every St. John's Eve (June 23) it was customary for the people to go to the hills and fields to gather it and hang it in their windows to put evil spirits to flight and as "a preservative against thunder."

Bouncing Bet, also an immigrant, has found its way into our fields by way of the garden. Our great-great-grandmothers cherished it as a garden flower, and its seeds doubtless came over in the same neat packets that guarded seeds of the larkspur and hollyhocks, the sweet-williams and pansies and pinks that went to the making of those delightful old-fashioned gardens that were to them a sweet and continuing reminder of their old home. Tired by and by of the restraint of garden life, Bouncing Bet escaped to the fields and lanes, where we now most frequently find it gay and sunny as ever.

Mulleins and butter-and-eggs and pussy's favorite flower the catnip, the mints of the tinkling meadow runnels and those round, soft cushions of wild thyme that cover the hills where

the sun lingers longest—these and a score of other familiar and humble herbs scattered about the farm's broad acres are of foreign origin, and Americans only by adoption. Landing generations ago on these shores of opportunity, friendless and without other capital than their abounding inherent life, they have liked the land and prospered, industriously following the plow of the pioneer ever westward, until now some are found at the Golden Gate itself.—*C. F. Saunders in Young People.*

COMPOSITION OF BACK VOLUMES.—Since this magazine has changed from a monthly to a quarterly it will be useful to have a summary of the volumes for use in making up sets for binding. *The American Botanist* began publication in July 1901 issuing two half-yearly volumes of six numbers each. In 1906 and the following years the numbers for July and August were omitted and the half-yearly volumes consisted of five numbers each having extra pages added to make good the omissions. In February 1908 the magazine became a quarterly. Volumes 1 to 10, therefore, consist of six numbers each, volumes 11 to 13 of 5 numbers each, and vols. 14 and all following of 4 numbers each. Beginning with volme 10, indexes were issued and bound in the last number of each volume. The index of volume 10, however, was incorrectly printed and a correct one was issued separately. Indexes for volumes 1 to 4 inclusive, were also issued separately. None have been issued for volumes 5, 6, 7, 8 and 9 but it is expected that these will appear soon. The first 13 volumes are for sale at 50c a volume, but at present may be had in sets for less. Volume 14 and following costs 75 cents. It is desired that purchasers of sets or single volumes have perfect copies and the publishers will gladly replace any numbers that are received in a soiled or torn condition.

NOTE AND COMMENT

Wanted.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their shorter botanical items. The magazine is issued as soon as possible after the 10th of February, May, August and November.

Fairy Rings.—In addition to the plants which Dr. Gleason notes as forming fairy rings we may cite several species of the fern-worts that do so. Accounts of some of these have appeared in the *Fern Bulletin*. In volume 7 the rings of *Lycopodium inundatum* are described. in volume 9 those of *Osmunda*, and in volume 15 those of *Lycopodium sabinaefolium*. We shall be glad to publish further notes on this subject if our readers will send them in.

Trimorphic Flowers.—Even the novice in botany is familiar with the fact that some flowers are dimorphic, that is some plants of a certain species produce flowers with long styles and short stamens while others are just the reverse with short styles and long stamens. Both sorts of flowers seem equally productive of seeds, but the two usually require an exchange of pollen to be completely fertile. Examples of such flowers will come to mind in the common bluet (*Houstonia coerulea*) moss pink (*Phlox subulata*) golden bell (*Forsythia suspensa*) English cowslip (*Primula veris*) and many others: in fact, dimorphic flowers are found in more than seventy-five genera of flowering plants, though any single genus may only contain one or two examples. So far as known all occur among the dicotyledons and nearly half among the Rubiaceae.

Trimorphic flowers, in which there are three lengths of stamens and pistils are much rarer but several instances are known. The most classic one, of course, is *Lythrum salicaria*, with which Darwin experimented but instances are known in *Oxalis*, the pickerel weed (*Pontederia*) and the water willow (*Decodon verticillata*). To be fully fertile, each flower must have pollen from the proper length of stamens in some other flower, and the visiting bees soon get three bands of pollen upon them, corresponding to the three different lengths of stamens. In some cases, the pollen grains in the different lengths of stamens, are of different sizes and appear to be functional only upon pistils of the proper length.

Change of Sex in Papaya.—It is pretty generally known that some species of plants are dioecious, that is, some individuals produce only staminate flowers, and others produce only pistillate ones. The tropical papaya (*Carica papaya*) is one of these dioecious species, but it has recently been discovered that under certain circumstances it can change its sex. For instance, if one of the pistillate, and therefore unfruitful, trees have its terminal bud removed it soon begins to produce pistillate flowers and these later ripen good fruits. No reason for such a change has yet been given but it will probably turn out to be akin to that which causes most plants to fruit when their vegetative existence is threatened in any way. The continuance of the species is the most important thing in the plant world, and the plants seem to make greater efforts to accomplish it than to perform any of their other functions.

Plant Hairs and Moisture.—The petunia and various other plants such as the tomato, tobacco and velvet-flower (*Salpiglossis sinuata*) belonging to the nightshade family (*Solanaceae*) are well-known to resist drouth most successfully though they are not especially deep-rooted. Their ability

to do this, it is now stated, is due to the clammy hairs with which they are covered and by means of which they absorb sufficient moisture for their needs from the nightly dew-fall. This explains the adaptability of these plants to sunny places. Some of them seem to actually do better with a minimum of watering. The common garden geranium (*Pelargonium*). one of the best of plants for a dry and sunny spot, is another that secures a supply of moisture in this way. In this latter plant there are two kinds of hairs, one of the ordinary shape and the other glandular. The material in the glandular hair has a great affinity for water, and this, when taken up passes readily on into the leaf.

TUCKAHOE.—That curious growth called tuckahoe or Indian bread which is occasionally found by those digging in the earth has long been a puzzle to scientists. It frequently reaches the size of a cocoanut or larger and when fresh the interior is white, soft and edible and has a sweetish taste. By general consent it has been called a fungus, supposedly allied to the truffles, and has even been given a name as *Pachyma cocos*. It has recently been discovered, however, that the tuckahoe is a sclerotium or resting stage of the mycelium of a species of *Polyporus* or shelf-fungus by the finding of the fruiting portion. Thus the guesses of the botanist as to its position in the plant world have been verified, though its relation to the truffles is not as close as it was thought to be before this latest discovery.

FLAGS.—Several different plants are called flags and it is necessary to get at the derivation of the word, flag, to understand the reason for it. Upon investigation we find that our word is found with scarcely any change in most of the Teutonic languages where it meant to droop or hang loosely. All the plants to which the name properly applies are characterized

by leaves that flag or droop. The word flag, therefore, can not be held to belong to any one family. The irises, however, usually go by this name, or some other word combined with it, as blue flag, yellow flag, flag lily, etc. The cat-tails were more often called flags in former days than at present. When they were used between the staves of a barrel to make it water-tight they were known as cooper's flags. Sweet flag also comes properly by its name and corn flag by which the gladiolus is sometimes known is also appropriate. It may be added, in passing, that our state and national flags have been named from the same word and for the same reason that the plants have been.

SPATHES AND LEAVES.—The members of the Arum family (Araceae) have been called "the composites of the monocotyledons" and fairly deserve the implication for like the true composites the "flower" consists of numerous true flowers clustered along a main axis or spadix. Surrounding these flowers there is usually a leaf-like organ or bract, which in this group is called a spathe, that not only protects the flowers, but by its color attracts insects to perform the work of pollination. The spathe is frequently supposed to be a corolla, similar to that of such plants as the morning-glory or pumpkin, and where one hears a reference to calla-lily flowers or Jack-in-the-pulpit flowers, it is usually the spathe and not the real flowers that is meant. Morphologically both petals and bracts are leaves, but the bract is much more leaf-like and often makes this plain by various freaky performances. In the April *Guide to Nature* is a photograph of some calla-lily flower-clusters that through some error in treatment have behaved in this way. In these, the leaves, instead of becoming green, were pure white and spathe-like, very similar to the ordinary spathes surrounding the flower-cluster. Upon consideration of the matter, it will be seen that this abnormal form

is not so far from the normal as at first appears. In this type of plant, the flower-cluster terminates the main axis. The first leaf below the cluster has been modified into a spathe in the calla, but in the nearly related golden-club (*Oronticum aquaticum*) the spathe is hardly perceptible while in the sweet flag (*Acorus calamus*) it is wholly leaf-like. The calla lily which developed two or more spathe-like organs carried the production of spathes a trifle farther than usual, that is all. In this way we can easily account for the double "flowers" of this plant, Jack-in-the-pulpit and the like. What causes the occurrence, however, is still a mystery to botanists. All that is known for certain is that any disturbance of the vegetative processes of the plant is likely to favor it.

NUTATION OF POPPY.—The poppy is one of a large number of plants that hang their flower-buds downward until the blossoms are ready to open. In the poppy the young buds form a conventional shepherd's crook, but the flower becomes erect at the time of expanding. Other plants such as the arrow-arum (*Peltandra virginica*) go through movements just the reverse of this, holding the flower-cluster erect until blooming, but after flowering turning it downward into the water where the seeds are ripened. A writer in a recent number of *The Scientific American* appears to have slightly mixed his facts on this head, for he says of the poppy: "Once this [the pollen] is received the changes ensuing result in sending off a second signal to the motor zone of the stalk and the curvature reforms the shepherd's crook which holds the capsule pendulous to drop the seeds when mature." It is possible this is the case in Arizona, but in more northern regions, the capsule is held stiffly erect, chinks appear in it at the top, just beneath the broad flat stigma, and through these openings the seeds are scattered one by one as the breezes rock the capsule on its stem.

THE WATER HYACINTH —One of the prettiest sights in the tropics is a sluggish stream or sunny bayou filled with a colony of water hyacinths (*Piaropus crassipes*) in full bloom. Notwithstanding this the plant is frequently regarded as a bad weed, for it multiplies so rapidly as to become a serious menace to navigation on many streams. For some years the national government has been trying to destroy these plants in the St. John's river in Florida but a post-card recently received from that region shows a portion of the stream crowded from bank to bank with the hyacinths with a small steamer blockaded in their midst. While constant attacks upon the plant may serve to keep the channel open in slow rivers, it is doubtless out of the question to expect to exterminate it in regions where the cold of winter is not sufficient to kill it. The plant is not native to Florida but behaves in all ways as if it were.

FRUITING OF TRAILING ARBUTUS.—The trailing arbutus (*Epigaea repens*) is one of the plants that seldom bear fruit, but whether this lack is due to the close picking to which the blossoms are subjected each season or whether there is a deeper physiological reason does not seem to be generally known. Certainly it is not due to other rapid ways of multiplying such as are possessed by the potato and artichoke. The blossoms of the arbutus are commonly supposed to be dimorphic, but more than forty years ago, Thomas Meehan pointed out that instead of the flowers being long and short styled, with stamens to correspond, they are more properly classed as dioecious, the flowers with perfect pistils having imperfect stamens and vice-versa. In none of these flowers, however, are either set of the essential organs entirely missing. It is to be noted that there is a sort of dimorphism in the flowers, after all, for in the pistillate form there are blossoms with long and others with short styles, while the staminate flowers have long and short stamens with perfect anthers. With flowers

of such structure it is impossible for some plants ever to produce seeds. Those who have reported this plant as fruiting freely have evidently discovered pistillate plants, while those who could find no fruit have probably examined the staminate form.

Edible Lilies.—The lily family is commonly valued for the beauty of its flowers rather than for its edible qualities, but several of the species are cultivated for the table and must not be forgotten. The succulent asparagus, the odoriferous leek and onion and several others belong to this family, not to speak of squills (*Scilla*), Sarsaparilla and Aloes which, if not strictly edible, occasionally find their way into the human stomach. None of these, however, are true lilies though they do belong to the lily family, but there are edible lilies, and the demand for them seems to be on the increase. According to a note in *Horticulture,* Japan, last year exported edible lily bulbs to the value of nearly $500,000. The species eaten are chiefly *Lilium speciosum* and its variety *magnificum*.

Use of Wood Pulp.—It is hard to realize that this country uses forty billion board feet of lumber each year. In fact, we cannot realize it; the amount is too great. Yet this is only one of the many drains upon our forests. Let us take a smaller item in the demand for wood which is not included in the above estimates. The yellow journals, and the rest of us, use about four million cords of pulp-wood annually. This amount is easily realized. A hasty calculation will show that it would make a pile of cord wood four feet high extending clear across the United States and back again. And this amount is used every year. The great metropolitan dailies are not the only enemies of our forests, but they are by no means insignificant elements in the movement that is sweeping this planet bare of trees.

MISNAMED SUNFLOWERS.—It is very commonly believed that sunflowers are so named because they turn their flower-heads to the sun in the morning and follow his course all day. A little investigation, however, will show that this is only a very pretty piece of fiction to account for the comon name. There may be sunflowers that constantly turn toward the sun, but our garden sunflower (*Helianthus annuus*) does not, nor do the common species of the fields, such as *H. grosse-serratus, H. lactiflorus, H. giganteus, H. occidentalis, H. tuberosus, H. strumosus* and *H. mollis.* These plants are adjusted to bright snulight and when growing in such a position that they are not equally lighted from all sides may turn toward the direction of greatest light, but that they do so when growing in the open fields may be doubted. In this connection it may be noted that the compass plants (*Silphium*), whose leaves are very sensitive to light, do not turn their flowers to the sun. Under these circumstances it may be queried whether there are any plants that do so. Observations of our readers are requested.

FORM VERSUS VARIETY.—If there is any botanist, living or dead, who has made a clear distinction between the words "form" and "variety" as applied to plants, we wish someone would rise up and point him cut. So far as our own efforts go, we fail to find much difference in the two except that the word variety is the more general term and may mean anything in plants less than a species. The use of the word *forma,* to designate trivial forms of plants due to variations in the soil, moisture, light, etc. in the plants' habitat has but recently come into general use, being first taken up extensively by the *Fern Bulletin.* Previous to that time variations in the species were usually known as varietiees. To change the name of a plant from form to variety or the reverse, would seem a mere change of terms not affecting the status of the plant form in any way. This being the case, it is surprising that a prominent botanist

should sieze upon such a slight pretext to get his own name into print. This, however, has been done in a prominent eastern publication where *Rhus glabra* VARIETY *laciniata* Carr., has been changed to *Rhus glabra* FORMA *laciniata* (Carr.) as a new combination in the full expectation, doubtless, that future generations will write the name of the aforesaid eminent botanist after the parenthesis. For ourselves, we are disinclined to accord him so dubious an honor.

NOTES ON USEFUL PLANTS.—The following titles relating to useful plants have appeared in this magazine. The numbers folowing the titles refer to volume and page, that before the colon being the volume. The sunflower as an economic plant 2:60, Uses of paper mulberry 2:54, Uses for white birch timber 4:17, The Eucalyptus as a rival to coal 5:78, Use of prickly lettuce 1:42, Plants used for flavoring 4:77, Use for the blue gum 6:17, Bagasse as paper stock 6:53, New use for sumac 7:75, Commercial use of deer-tongue 5:97, Yellow pine cigars 1:29, The Hackberry for shade 10:15, Novel use for milkweed pods 11:89, The osier or basket willow 11:68. Soapworts 9:56, Soap tree of Algeria 6:94, Another soapwort 11:45, A saponaceous family 5:38, Chinese soapberries 10:74, Mosses used in millinery 3:36, 3:73, New use for fern rhizomes 6:15, Use of the common woodfern 3:17, Polypodium fibre 8:117, Materials for smoking 12:45, Willow bark for smoking 5:16, 5:60, Chrysanthemum smoking 8:115, New use of white-wood 3:36, Orris root 2:90. Chemicals from wood 7:52, Croton tinctorum 12:83, Death of old dyes 7:8, A date-leaf boat of Arabia 4:27, Porto Rico palm houses 7:106. Any single volume may be had for 50 cents or for 40 cents when ordered with a year's subscription. The numbers are not sold separately. Prices of complete sets will be found in the advertising pages, and lists of different titles in previous numbers.

Mahogany.—When we speak of a certain wood as mahogany we doubtless have a very definite idea of what mahogany is, but when we investigate the subject we find the name applied to so many different woods that certainty gives place to uncertainty. What lumbermen and foresters generally call mahogany is known to botanists as *Swictenia mahogoni.* It belongs to the Meliaceae of which the China-berry tree of our southern States is also a member. The generic name was given in honor of a Holland doctor named Swieten, and the specific name is an adoption of the Indian name for the tree. So much for the true mohagany. Of the others, according to a writer in *Forest and Irrigation,* the African mahogany is *Khaya Senegalensis* and the Indian mahogany is *Soymida febrifuga.* The sweet gum (*Liquidambar styraciflua*) is occassionally called mountain mahogany, the catalpa (*Catalpa speciosa*) is known in the furniture trade as white mahogany, one of the Australian gums (*Eucalyptus resinifera*) is called red mahogany and the red bay (*Persia borbonia*) is the Florida mahogany. The coffee tree (*Gymnocladus canadensis*) and the western sumac (*Rhus integrifolia*) are also called mahoganies and several other trees no better fitted than they, possess this title.

Japanese Nomenclature.—When it comes to a particularly fine and complex job of naming things the inhabitants of the land of cherry blossoms are not a bit behind their antipodes in dexterity. In the Japanese *Botanical Magazine* for July, we find the name of an early flowered form of their beloved cherry tree given as follows: *Prunus psendo-cerasus* Lindl. sub-species *Jamasakura* (Sieb.) Makino variety *glabra* Makino forma *praecox* Makino; or, if we leave out the five "authorities" which have become entangled in the combination we have as the name *Prunus psendo-cerasus Jamaskura glabra praecox,* which is still plenty long enough for the designation of

a mere form and quite calculated to make the adherents of the "American code" turn green with envy. In the early days of botany, every plant was designated by a string of latin words something like this, but Linneaus and his contemporaries brought order out of chaos by perfecting the binomial system by means of which each plant was designated by two words and no more. It has remained for the moderns to turn this back in to a semblance of the nomenclature of the middle ages. It is not quite fair, however, to class this example with those of pre-Linnaean days for in the new scheme, the position of each word stands for a certan degree of distinctness, and may be roughly likened in this respect to the figures in the decimal system.

THE PITCHER-PLANT'S PITCHERS.—It has usually been taken for granted that the pitcher plant (*Sarracenia purpurea*) catches and digests insects for the nitrogen they contain, just as the sundew, butter-wort and others are known to do. Some experiments which have recently been carried on by Miss Winifred J. Robinson seem to indicate that the chief function of the pitchers is not that of catching insects, but of storing water for the use of the plant. While the experiments apparently prove that the pitchers have no fat-digesting or protein-dissolving powers, it has been shown that they are able to reduce sucrose and starch to simple sugars. The author says: "*Sarracenia purpurea* belongs to the class of plants, which like the bromeliads of the tropics or our Northern catchfly, illustrates a mal-adaption between plant and animals, for while they serve as traps for insects they are neither harmed nor benefitted by them, unless the number be very great. In the sphagnum bogs where *Sarracenia* grows, the concentration of salts and nitrogenous matter about its roots is so great as to place them practically under xerophytic conditions. This would tend to render the root system inefficient as a means of water absorption and make the possession of a water-storing

organ like the pitchered leaf of great advantage to the plant." The statement that nitrogen is abundant in the habitat of the pitcher-plant is also unusual. Most botanical writers state that the insectivorous plants catch insects because of the dearth of of nitrogen in the soils they inhabit. It is evident that the last word on this subject has not been said.

POLLEN.—Even in our ordinary garden flowers which are fertilized by the bee or other insects, the pollen grains enormously outnumber the possible seeds and every bee-keeper knows that the bee appropriates a very liberal percentage in return for the service rendered in carrying the balance from bloom to bloom and thus involuntarily mating them. Many trees and other plants, in addition to the grasses, trust entirely to the wind to carry the pollen to the female flowers, which are frequently borne on other trees or on smaller plants than those which bear the pollen flowers. In these cases, nature, in order to secure the continuance of the species, despite the enormous waste involved by such a mode of distribution fashions a far greater quantity. At the right period, the stroller through pine forests may now and again see or be enveloped in what appear to be clouds of mist or smoke when a passing breeze shakes the foliage and liberates the pollen of the flowers associated with it. Countless millions—numbers, indeed, are mocked at in such connections—must miss their goal for every one which attains it, and yet in every one the race potencies are complete despite the minuteness of the chance afforded them for development. The human workman who was employed to make, say, a million delicate machines, knowing that only one would ever be used would, we fear, be tempted to scamp a good many, but nature scamps nothing and perfection is her maxim throughout.—*Indian Gardening.*

FIELD BOTANY

Edited by Dr. H. A. Gleason, Urbana, Ill.

FAIRY RINGS.

WE all know what a fairy ring is, a mysterious circle of mushrooms that springs up as if by magic in some meadow or lawn, and excites the wonder or imagination of many people who see it but cannot explain. One might make a very interesting collection of the folk-lore which is connected with them. A mushroom fairy ring persists for a long time. It re-appears regularly in its due season, and gradually increases in diameter until finally parts of the circle die, and the few mushrooms remaining give one but little idea of the symmetry and regularity of the original ring.

The actual cause of the fairy ring is the growth of the underground parts always *away* from the center and never *toward* it. Just why the mushroom should behave in this manner is not entirely clear. Two theories have received a good deal of attention; one, that the food supply has been exhausted within the circle, compelling the plants to move outward into fresh earth, and another that the plant has excreted a poison into the soil, which prevents it from growing again in the same place.

The fairy ring of mushrooms is the best known because of their large size and their sudden and mysterious appearance, but it is by no means the only kind. In general, any plant which spreads regularly in all directions and dies out in the middle may form rings, and one needs only keep a sharp lookout to find many different kinds, produced by a large variety of plants.

The smallest fairy rings which I have seen this summer were made by an orange-brown lichen growing on limestone

rocks. The rings were sometimes no larger in diameter than a led pencil and ranged in size up to two inches across. But in every case they were quite symmetrical, bright orange-brown at the edge, and dull brown in the center where the older parts had died. When young these lichens form a small circular spot. Growth can of course take place in all directions and as long as the rate is uniform on all sides the circular form will be maintained. The older, central parts soon die off, and the result is a small, but perfectly formed, fairy ring.

A larger ring, but due to the combined influence of growth and death in the same way, is exhibited by the moss-like *Selaginella rupestris.* The plant starts from a small circular mat which lies flat on the ground and spreads uniformly in all directions. Its center eventually dies away, leaving a bright green ring of live plants which contrasts strongly with the black, deadened portion within and soil without. These rings vary from one to three feet in diameter, and the living zone at the circumference is two or three inches wide. There is no apparent reason why they should not exceed three feet in size, but no larger perfect rings have been seen Parts of the ring may die, or obstacles may be encountered, and in this way the ring is broken or its symmetry destroyed. One may easily find arcs of circles, which if complete would be four or five feet across. The most peculiar feature of these fairy rings is that a second may appear within the first, or that two of them may overlap.

In Kerner's "Natural History of Plants," which, by the way, is a regular storehouse of information and suggestion for the out-of-door botanist, one may read of the rings formed by certain kinds of European grasses. In this country a low sedge, *Carex umbellata,* and a common grass, *Andropogon scoparius,* both produce very sharp and well marked rings. They also are formed by radiating growth and the subsequent death of the older, central parts. Both species produce large

dense tufts of basal leaves, and when the ring is small the leaves from opposite sides generally meet across the middle, and one must then part the leaves with the hands in order to reveal the ring-like growth. But, as the size increases with the slow spreading of the plants, the interior of the ring becomes exposed. The maximum diameter of these rings is about three feet, and it is very seldom that one finds the central portion occupied by any other plants.

Two of our largest prairie grasses, the blue-joint, *Andropogon furcatus,* and the Indian grass, *Sorghastrum avenaceum* are also ring-formers, but in a less conspicuous way. As the diameter of the colony increases the central portions do not die away completely, and the patch remains solid. But only the outer, younger parts send up the flowering stems which consequently appear as a ring around the margin. These species are two of our largest grasses, sending up flowering stems four to seven feet high, and forming rings four to six feet across.

For fear that some may not understand the purpose of this department, let it be repeated that it is to awaken an interest in the out-of-door, first-hand study of botany. The editor stands ready to identify plants or answer questions on any phase of field work. And at the same time your own notes and experiences are desired for publication. If you have had an interesting field experience, send it in; it will interest others as well as yourself.

There is a rush, *Juncus balticus,* which is very common along the sandy beaches of our Great Lakes, and which is striking for its growth, not in rings, but in straight lines. The plant spreads by an under-ground stem, which grows perfectly straight and sends up erect stems at regular intervals, about an inch apart. These stems, therefore, appear along the sand

in straight lines or rows. Those nearest the parent plant are of course the oldest and have the advantage in size, while the younger are all successively smaller. This habit of growth in lines is shown by many plants, but seldom so regularly or so conspicuously as by this rush.

What boy or girl has not thrown maple seeds into the air, and watched them whirl rapidly as they slowly fell to the ground? Many other plants have fruits or seeds which behave in the same way, and some of them can be found almost any time during the summer. Ash, linden, box elder, and tree-of-heaven are some common examples. Why do they whirl so? Try some of them, examine them carefully, and see if you can find out. If you have studied physics, compare the motion of the seeds with what you have learned about the inclined plane. As to the use of it, one can easily see that by falling so slowly they can be carried farther by the wind before they reach the ground.

Sometimes our wild plants have difficulties in getting their seeds properly planted. A curious incident of the accidental planting of seeds was observed this summer on an area of bare sand. Every year the wind blows thousands of seeds upon this sand, but the next wind will blow many away, and those that remain have no means of getting down beneath the surface to a depth suitable for germination. A wagon had been driven across this sand just at the right season. The heavy wheels had crushed the seeds down two or three inches into the sand so that in the spring they had a favorable opportunity to grow. As a result, the route of the wagon is marked by rows of living green plants, indicating the position of every wheel track, while elsewhere the sand is almost bare. Many of the plants in these rows are Partridge-pea, which has very showy yellow flowers, so that the wheel tracks at this season are outlined in yellow and visible from a long distance.

EDITORIAL

About this time of the year the spell-binders of the great political parties are beginning to adjure the young voter not to vote the opposition ticket just because his father and grandfather did so, but the politician is not the only person who is bothered by this phase of ancestor-worship. A regard for tradition is so deeply ingrained in human nature that it acts as a clog upon progress in all walks of life. In the schools ancient history, the dead languages and others that ought to be dead, still crowd more useful studies largely because these were the studies of a thousand years or more ago. Time was when a liberal education consisted of a knowledge of history, Latin and mathematics. Then it was that people believed in fern-seed that would make one invisible, in the philosopher's stone for the transmutation of metals, in the mandrake which emitted blood curdling shrieks when pulled up, in the barnacle goose which grew upon trees, in devil-fishes that could sink large ships, in witches, demons, cockatrices, phoenixes, were-wolves, unicorns and other equally attractive creations of a superstitious age. It is a wonder that it never occurred to some Hodge of that ancient day to start a course of nature-study with "The Arabian Nights" and "Gulliver's Travels" as texts Times have changed, but the established order of things has always been a few laps behind. We still are too prone to consider a knowledge of the classics to be the chief end of man. One by one, however, the sciences have fought their way up to recognition. Alchemy, fit subject for those benighted times became our modern chemistry, natural philosophy, at first the plaything of the curious became physics, while natural history turned to biology with its two sister sciences zoology and botany. But always these have had to fight to maintain their places, and even today a large number of the pupils in the pub-

lic schools end their days of study with little or no knowledge of the earth upon which they live, of the plants and animals among which they must live, or of the natural forces which make such living possible. Is it at all remarkable, then, that the great public is still back in the middle ages so far as its understanding of natural phenomena is concerned? Absolutely ignorant of botany, it is not surprising that many people still plant their seeds in "the sign of the moon," believe in man-eating plants, dose their ailing shade trees with calomel and sulphur, and swallow with gusto the silly stories about plants in the Sunday paper. With no idea of zoology, they may well believe horse-hairs turn to snakes, that dragon flies will sew up their ears, that a crow with its tongue split can talk, that a snake's tail always lives until the sun sets, that a snapping turtle never lets go until it thunders and so on through the list. A large number of the people in enlightened America still believe in ghosts, dreams, fortune-telling, divining rods, the evil eye, luck, witches, charms, etc., but these are the people who have never studied the sciences. At present educational circles are wrought up over the question of whether we should teach for vocation or for avocation but behind this is the more important question of shall we teach pupils of the past or fit them for the future? If for the future, history, art, literature and the languages, however valuable they may be in any form of culture must give place in large measures to the sciences, mathematics and a thorough drill in our mother tongue . It is inconceivable that the world will much longer tolerate a system of education that does not look toward a knowledge of the earth, the animals and the plants for every pupil. Science and superstition cannot dwell in harmony To foster the one, is to eradicate the other.

* * *

Occasionally we hear it said that the study of botany is a fad that is bound to decline in popularity, but recent statistics

from the universities do not give the pessimists much encouragement. According to *Science* there were 184 doctorates in science conferred in 1908 and when these are sorted out according to subject, botany stands sixth in the list, being exceded by chemistry, physics, zoology, psychology and mathematics only. Other familiar sciences that fell behind it are geology, physiology, astronomy, anthropology and anatomy. It also shows up well in comparison with the languages for Latin can show but one more doctorate to its credit while Greek has 2, the romance languages 1, and the German languages 3 more. The highest number of doctorates conferred in any one branch was thirty-two, history and chemistry each claiming this number. Zoology, the second highest science was only exceeded by English. Nearly one hundred more doctorates were conferred in science than in all the other branches combined.

* * *

Another illustration of how easily the public can be fooled about anything that pertains to science has been given by no less a publication than the *Technical World* which published a most astonishing and eroneous acount of "The Rootless Cactus of California" in the July number. A straightforward and accurate article upon anything botanical has very little chance of getting into print in competition with these wonderful stories of things that exist only in the imagination

* * *

The *Botanical Gazette* recently advanced its subscription price from $5.00 to $7.00 a year, giving as the reason the increased cost of publication and, by implication the lack of support. At the $5.00 rate it is asserted the magazine ran about $2,000 behind each year. Some investigations of the price of European botanical publications indicate that they cost their subscribers about one cent a page. At the new rate the *Botanical Gazette* will cost about three-fourths of a cent a

page. It may be said in passing that the rate of *The American Botanist* is the lowest of any, being about half a cent a page. It is to be regretted that the constantly advancing prices of such publications as *The Botanical Gazette* and the *Torrey Bulletin* are drawing them away from the common people who cannot, or who will not, pay such prices, thus leaving a gulf between the general public and the scientist which should not be. It will be a bad day for botany when the leaders get perched so high upon their pedestals that the rest of us cannot find out what they are doing.

BOOKS AND WRITERS.

The American Inventor which many will remember will regret as the successor to *Popular Science* has recently ceased publication.

It does not take long to get a reputation for age among botanical publications. One change after another serves to put the well-known names of such publications into the limbo of forgotten things. A few years ago, *Meehans' Monthly* was among the first of botanical magazines. At the death of its editor it was merged with *Floral Life*. A little later and the well-known *Mayflower* met the same fate. Now *Floral Life* has lost its life and has been merged with *The Household Journal,* a 14 page publication which began existence this year. Surveying this great mortality the *American Botanist* begins to feel quite aged.

With the September number, *Forestry and Irrigation* published at Washington, D. C., changes its title to *Conservation.* The journal, now in its 14th volume began life as a thin monthly called *The Forester*. Later it joined forces with *Irrigation* with the title it has used up to the present. It is now a

representative magazine devoted to the conservation of our woods, waters, soils and ores and is doing most valuable work in awakening a sentiment for the protection of our natural resources.

Miss Anne Wilson has recently issued a little book called "Boggy Solitudes of Nantucket" which is mainly a chronicle of some of the plants and animals of the region mentioned. It is somewhat after the manner of a local flora and somewhat after—a long way after—Mrs. Danas "According to Season." Those who visit Nantucket will find it a good book to take along though it does not give localities for the interesting plants mentioned. It is published by the Neale Publishing Co., New York at $1.25.

Tree-books, good, bad and indifferent have appeared on the market and all, even the bad ones, have done something to advance the knowledge of our trees, but no single book that the reviewer has seen contains so much that is useful and so little that is bad, as "Our Trees; How to Know Them," by Arthur I. Emerson and Clarence M. Weed. Anyone with intelligence enough to recognize a given tree when he sees it a second time cannot go astray with this book. Each tree is illustrated by a good plate, or rather a composite plate, which gives a view of the tree as a whole, with usually life sized photographs of the leaves, flowers and fruits and one has but to turn the pages until he comes to an exact representation of the tree he wishes to name. On the page facing each plate is a popular account of the tree, including its range, folk-lore, poetry, etc. The book is a large and well printed octavo of nearly 300 pages and is published by the J. B. Lippincott Co., Philadelphia at $3.00 net.

VOLUME 14, NUMBER 4 WHOLE NUMBER 79

NOVEMBER, 1908

The AMERICAN BOTANIST

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CONTENTS

WILLARD N. CLUTE & CO.
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The American Botanist

QUARTERLY DEVOTED TO ECOLOGICAL AND ECONOMIC BOTANY

WILLARD N. CLUTE ❧ ❧ ❧ EDITOR

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ROSETTES OF HELIANTHUS OCCIDENTALIS.

THE AMERICAN BOTANIST

VOL. XIV JOLIET, ILL., NOVEMBER, 1908 No. 4

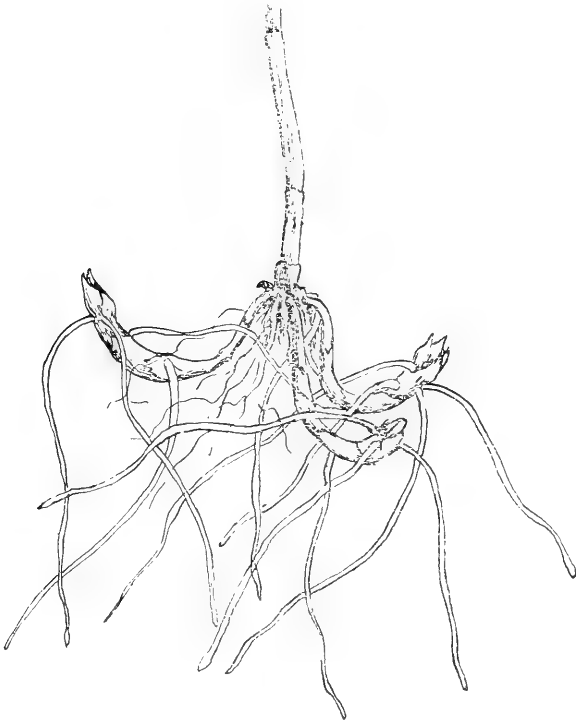
"These naked shoots,
Barren as lances, among which the wind
Makes wintry music, sighing as it goes,
Shall put their graceful foliage on again
And more aspiring, and with ampler spread,
Shall boast new charms, and more than they have lost."
—*Cowper.*

THE EVOLUTION OF A TUBER.

BY WILLARD N. CLUTE.

THE true sunflowers, members of the genus *Helianthus* are supposed to include both annual and perennial species, but a very slight investigation is sufficient to show that there are very few of the latter among them. It is true that many species, once planted, will continue to come up for years instead of dying at the end of the season as the common sunflower of the gardens (*Helianthus annuus*) does, but the fact remains that the plants which come up are no more the plant originally planted than are the seedlings of the garden sunflower which may spring up in subsequent seasons. To be considered a true perennial *the same plant* must live for several successive seasons. The Solomon's seal, blod-root and trillium are real perennials; the sunflowers only appear to be such because many of them have evolved special means for carrying the life of the species over seasons unfavorable to growth. The garden sunflower has but one way of surviving the winter namely, by means of seeds in each of which is snugly packed a miniature plant, while the parent plant dies and is therefore an annual.

It may be said here that annual plants are annuals, not so much because they cannot survive the rigors of winter, as because they die of exhaustion due to seed-bearing; indeed, many plants that survive the cold and storms of winter as mere seed-



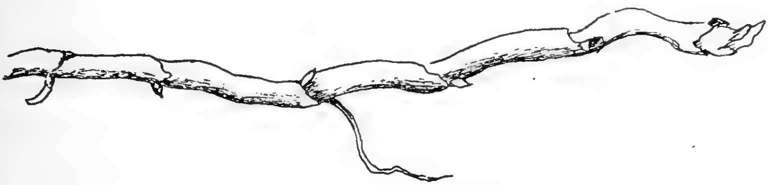
HELIANTHUS SCABERRIMUS

lings, die in the midst of summer's plenty having used all their strength in the production of flowers and fruits. Many an annual which ordinarily completes its life-cycle in a few weeks or months in the milder part of the year will, when planted late in autumn, thus survive the winter as a "winter annual." The century plant (*Agave*) is typical of still another phase of plant life. In this, the plant gathers strength for several years and then finally blooms, fruits and dies but not before it

has produced several off-shoots from the base, each of which may develop into a new plant and repeat the process.

Returning to our sunflowers, we see that if our species of the garden should be able to put out basal shoots after the manner of the century plant, it would be as much of a perennial as many of its relatives regarded as such, though the original plant would no longer be in existence. This is exactly what happens in the case of the western sunflower (*Helianthus occidentalis*) a species of the western plains which, after flowering, sends out basal branches that travel for some distance just beneath the surface of the earth and finally reappear forming handsome rosettes of sturdy green leaves that become well established plants before the advent of winter. Here and there along their course underground, the branches put forth roots and these act as gatherers of food for the new plant until it is entirely independent.

There is, however, many dangers threatening any plant whose leaves are above ground all winter. It would be much better, apparently, to have the permanent parts below the

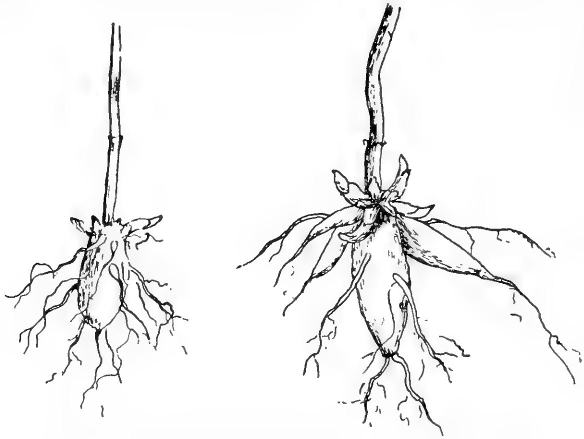


HELIANTHUS GROSSE-SERRATUS

surface. This latter method has been adopted by the rough sunflower (*H. scaberrimus*) which sends out shorter branches or runners which stop just at the surface of the earth and there produce a bud-like tip and numerous roots but with no leaves above ground. The hairy sunflower (*H. mollis*) and the large-toothed sunflower (*H. grosse-serratus*) have improved upon this method, somewhat, by sending their subterranean branches deeper into the soil where they are safe from evapora-

tion, mechanical injury and sudden changes of temperature. Not until a new spring do their bud-like tips start upward.

All these subterranean parts are true branches and in the large-toothed sunflower, at least, plainly indicate their relationships by often springing from the stem at some distance



YOUNG HELIANTHUS GROSSE-SERRATUS

from the ground and making a decided downward curve in order to enter the soil. A section of the lower part of the stem of this species will afford an excellent study in plant adaptation. Nearest the roots are branches that are plainly destined to become subterranean and to produce new plants vegetatively, at the other extreme are aerial branches intent on the production of flowers and seeds, while between them are dwarfed branches, some of them little more than buds that seem to have been in some doubt which way to grow and so have grown little in any direction. This, too, is a good illustration of the old saw that "he who hesitates is lost" for these examples of indecision fall with the dead stem and so come to naught.

In the large-toothed sunflower is also seen an effort to store an unusual amount of food. Large plants have two or three stout straight roots projecting downward at an angle not unlike dahlia "tubers" as the roots of that plant are often mis-

called. The dominant instinct is seen even in the seedlings which, whether they flower the first season or not, are sure to lay up a store of food in the tap-root which becomes thickened and rounded in the process. If the main stem of such a plant continues to send up new stems for several successive seasons. it is of course, a real perennial, and the species under discussion is near to becoming one, but even in the seedling there is manifested a disposition to send out underground stems like the others mentioned and to become not a perennial plant but a perennial succession of plant parts.

The showy sunflower (*H. laetiflorus*) wastes no time in storing food in its roots. It is wholly committed to storing its food where the new plants can use it most readily. Its branches dip down from the base of the stem as in other species but the food-store is now localized near the tip of the underground part instead of more or less throughout its length. Enlargements of the branch, here and there, however, indicate that the storing of the food in the tips is a character as yet none too firmly fixed. The roots springing from the food-bearing part are now less numerous; in fact, we here have a real tuber though rather longer for the diameter than we are accustomed to fancy such things. It is, howevei so well stocked with inulin, the material allied to starch so commonly stored by Composites, that it is crisp, tender and quite edible.

Last in the series comes the artichoke (*H. tuberosus*). Its tuber-bearing branches no longer spring from above ground but are given off below

HELIANTHUS LAETIFLORUS

the surface like those of our common potato. Like that species, too, the tip is the part reserved for storage and is rounded out into a shape approaching spherical. It produces no roots and the stem along which the food is brought for storage is slender and apparently intended merely to transport the food. The tuber still bears scales that are manifestly homologous with the leaves on the aerial stems and they subtend the buds that will give rise to new aerial stems next year. These leaf-like parts are not so clearly discerned on the potato, which is the tuber *par excellence,* but they may be found forming part of the "eyes," as the transformed nodes of the stem are called. The sunflower tubers lack the corky outer layers of cells that keep the potato from shrivelling when exposed to the air and so are more dependent upon the earth for protection, but they are tubers none the less; the last step in the evolution of an underground method of vegetative reproduction.

HELIANTHUS TUBEROSUS

CHLOROGALUM POMERIDANUM.

BY MRS. EMMA BUZEK.

AMONG the first plants to show signs of renewed activity after the winter rains in California are over is the soap root (*Chlorogalum pomeridanum*). Last year early in March, while climbing the hills I saw clusters of leaves with blades of bright green, rippled along a midrib from two to three feet long. They were beautiful, and I anticipated something rare when the plant should blossom. A few weeks later, thinking it about time for the flowers to appear, I went to see them, but found all signs of life gone; a few dry, brown leaves were all that remained to indicate where the plant had been. I was much disappointed, and promised myself I would watch more closely another year.

The following July I was walking in the same region, and came upon a slender stalk growing from the spot where I had seen the clustered leaves; this stalk grew rapidly to the height of five or six feet, with widespreading branches, so that it looked like a small tree. Every afternoon at about four o'clock the branches were covered with the dantiest little flowers of lily shape, giving promise of seeds in abundance for my collection.

After the seeds matured I decided to examine the roots of this wonderful plant which could produce such a luxuriant growth of leaves, such beautiful flowers, and such quantities of seeds on a dry hill side where everything else had given up the struggle long ago. So with knife and trowel I proceeded to dig it up, finding it more of a task than I had supposed. I dug until I had a hole about eighteen inches deep, dry and hard to the bottom; I was fast becominng discouraged when my trowel went into a cavity, and the hard work was over.

This cavity was eight inches in diameter, and exactly the shape of the bulb which had shrunk to half that size; a thick coat of ragged brown fibres surrounded the bulb, many of

them penetrating the ground around it, thus aiding the leaves in the short season durinng which they could work to lay up material for the flowers and fruit which come like a miracle on the brown and sear hills of summer time in Southern California.

The Spanish Californians use this bulb for soap, and as a hair tonic. It is also said to be an excellent remedy for poison oak, but aside from these useful properties the soap root cannot fail to be of greatest interest to every plant lover because of its delicate blossoms and strange, rapid growth.

Orange, Cal.

THE PINE BARRENS OF LAKEHURST, N. J.

BY PAULINE KAUFMAN.

A trip to Lakehurst, N. J., took us, my sister and self, from North Ashbury Park to Redbank, where after a long delay, we were able to get another train, going over practically the same ground, though further back in the country, to reach our goal. The name Lakehurst, is more than usually justified for there are small lakes all over, and the pine woods are also there. Arrived at the station, we were met by our guide, and followed the railroad track some distance, keeping parallel with a little channel alongside, when the joy of finding the first white *Sabbatia,* repaid us amply for the trials and tribulations of the road. These plants, two feet high, have opposite branches, the upper ones forming a flat top. The deeply cleft flowers are pure white, throughout, there being no trace of the center coloring found in our ordinary pink Sabbatias. All summer I had planned to go to Tom's River, where I had been told, this *Sabbatia paniculata* could be found, and here there was quite a good deal of it. Of *Lophiola aurea,* the gray wooly cymes were left, and just one flower showed us the pretty orange color. The perianth is six-cleft, and the whole plant is soft and wooley. *Lacnanthes tinctoria* so new to me that I

had never even seen an illustration of it, we found near the *Lophiola,* which it resembles enough to be a first cousin. The roots are fibrous and red, giving it the common name of red root. The sword-shaped leaves are clustered at the base, and scattered on the stem. The perianth is gray wooley on the outside, and the flowers are yellow fringes just like the witch hazel. A very small *Xyris* was also seen, as were many bushes of sand myrtle, gay with the flame colored fruit and glossy evergreen leaves. This little plant rejoices in the name *Leiophyllum buxifolium,* which perfectly describes its leaves. All that was left of the turkey beard were the tall wands, clothed with long white hairs, and bearing the seed pods. Better known were the plants of the shrubby St. John's wort, (*Hypericum prolificum and nudicaule*) and *Woodwardia virginica.* Along a sandy road, walking in a different direction, we found a carpet of glossy leaves and scarlet berries, entirely unfamiliar. These were *Arctostaphylos uva-ursa,* the bearberry. This part of Lakehurst would be invaluable to the student of oak trees. Any number and variety are there. Our luncheon was eaten in the company of pitcher plants, three sundews, *Rhexia, Lobelia,* cotton grass and various other denizens of the bog, with *Apocynum Millerii* not far distant.

It was now time to turn homeward and our good guide selected a different route, which in a short time brought us to so lovely a place, that there was a universal shout of admiration. It was a typical scene in Japan. We stood upon a small rustic bridge, with open spaces on the sides, which made frames for the loveliest pictures. The water on one side of the bridge, was covered with white water lilies, while on the other the yellow pond lilies floated. The lakelet was dotted with small islands and peninsulas, from one of which almost hidden from view, a flock of white heron slowly winged their flight. A short walk around, proved us to be "disturbers of traffic" for

we unconsciously startled a great number of butterflies of various denominations from a small space of ground, nor could we discover the cause of the large gathering. About a quarter of an hour before train time we passed a house, with a tall pine hedge around it. Here, Miss Knox told us, lived the neice or grand-neice of John Torrey, and here he had spent some time, when Lakehurst was still Manchester. Many of the trees he had planted were still alive, among them a redwood; alas, that we knew not this, when first we started, for we had to pass on. It will be the object of a spring trip to Lakehurst, however. In the three hours spent there, we did not meet a single person, until we came to the town pump. It is from spring until winter a deserted village.

New York City.

A VEGETABLE WONDER.

BY DR. W. W. BAILEY.

AN old army friend of the writer, famous for his quaint and naive remarks as well as striking anecdotes, used to say that when, during the Mexican war, he first saw the giant cactus or *Cereus,* he "sat down on a rock and haw-hawed." Quainter and more bizarre than any cactus, absurd as many of them appear is the *Welwitschia mirabilis* of western Africa. It was at one time called Tumboa, perhaps the native name, though the word appears among the tribes to be generic for any short-stemmed woody plant. The famous Dr. Hooker of Kew Gardens, who made a thorough study of the plant gave it also its present name after the discoverer, Dr. Welwitsch. We could well wish that his title had been more euphonious, but "what's in a name"—or in a pun?

It belongs to the family Gnetaceae, relatives of Coniferae, and among which, on our far western plains, is found the curious *Ephedra.* Our African plant, the subject of this article, appears as a very short, inverted woody cone, presenting in

its germinating condition two seed-leaves. These are of a leathery consistence, but finally by action of the winds, separate into shreds many feet in length. It was, then, once considered that these cotyledons are the only foliage that the plant ever possesses. The fructification is by means of cones appearing on the periphery of the stocky stem at the bases of the opposite leaves. Some of the flowers are pistillate and some are perfect.

These "trees," if we can so call them, have been aptly termed "anvil-like" and the sandy country is studded with them. The discoverer found them deeply imbedded in the soil and resembling a cracked and dried up *Polyporus*. They have a decidedly antediluvian suggestion and, in some respects, seem to connect Angiosperms with Gymnosperms, or plants with closed ovary with those of naked ovules.

While, as above stated, the leaves were once considered persistent cotyledons, more recent investigations at Kew led rather to the supposition that they represented the plumule and that the seed-leaves were deciduous. This matter was brought out in 1880, in Nature, Vol. 22, page 590. The plant lives for more than a century. Good pictures and analyses are given in Dr. Hooker's translation of LeMaout and DeCaisne's Botany. Hooker also issued a fine monograph of the genus.

Brown University, Providence, R. I.

AN UNUSUAL USE OF POLLEN.—In a recent number of the *Philippine Journal of Science* Count Ugolino Martelli states that in parts of the Philippines a screw-palm (*Pandanus tectorius* var. *laevis*) is cultivated for its pollen which is used as a hair powder.

NOTE AND COMMENT

WANTED. Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their shorter botanical items. The magazine is issued as soon as possible after the 10th of February, May, August and November.

MAHOGANY. Supplementing your note on this subject in the *American Botanist* for August, I might mention that certain species of *Cercocarpus* frequent shrubs or small trees of the Pacific Coast are popularly known as mahogany or mountain mahogany. The wood is exceedingly hard and has been found by the "Digger" Indians very serviceable for the manufacture of their potato sticks, as the sharp pointed implements are called which are used for grubbing up the wild bulbs that are so characteristic a feature of the diet of these aborigines. *C. F. Saunders, Pasadena, California.*

BUMBLE BEE AND CLOSED GENTIAN. The other day I came upon a patch of *Gentiana Andrewsii* at Monache, New Jersey. Upon investigation I found a number of them rather open at the top. Can this be *G. saponaria*, I thought. Just then a large bumble bee came noisily along and solved the question for me. For he alighted on one of the closed blossoms, and proceeded at once with great energy to enter it in a rather burglarious manner. Gaining a firm hold with his four hind legs, he grabbed the petals with his two front legs, tearing the flowers violently open. He then thrust in his head, following it up with the throat and most of the rest of his body. Having extracted the netar, he subjected about a dozen other

blossoms to the same rough treatment, leaving them all gaping open at the top. Of course the gentian has got to be cross-fertilized in some way, but to be witness to the proceeding, is certainly interesting. The bee accomplished all this in a surprisingly short time, and somehow it looked funny. I believe, the bumble-bees are real burglars in their quest of honey. When they find a flower so constructed, that it is difficult to get at the nectar, they break in. The torn labellum of the *Cypripediums*, that one sometimes meets with, and damages done to other flowers of complicated construction, I am inclined, to lay at their door.—*J. C. Buchheister, New York.* [Mr. Buchheister is correct in his estimate of the bumble-bee's actions. More than a hundred different species of flowers are known that are systematically robbed by the bees. Most of these produce their nectar in parts too remote to be easily reached by the bee in the conventional manner so he bites through from the exterior. Not the least remarkable feature of this operation is the fact that the bee knows enough to go direct to the nectar bearing spots from the outside. Apparently it requires considerable reasoning for this.—*Ed.*]

Long-lived Seeds.—Recent experiments seem to show that some seeds can retain their vitality for nearly 250 years. The greatest number of long-lived seeds are found among the Leguminosae the family that includes the familiar beans, peas, clovers and lupines of our gardens and fields.

Changes in Violet Leaves.—This season I observed the peculiar action of a specimen of *Viola ovata*. It was *ovata* sure enough, when I saw it first. Then it had more flowers than leaves, and these latter were of the usual egg shaped form and densely pubescent. It was a fine plant, so I took it up and home, planted it in a pot and left it on the windowsill. It did all right, and when it had passed flowering, the leaves

came up, large and plentiful, as it is the custom with violets. But to my surprise the leaves underwent a gradual change. First, they became cut-lobed at their lower ends, then the cuts and lobes increased in size, gradually, till the leaves assumed the shape of those of *viola palmata*. Also they became smooth. If I did not know that the plant was originally *ovata,* I woulld have collected it now as *V. palmata,* if I had found it wild.—*J. C. Buchheister, New York.*

Fruiting of Trailing Arbutus.—Further evidence regarding the fruiting of *Epigae repens* is furnished by Miss Mary E. Hatch, Cambridge, Mass., who writes:

"I have examined three patches of *Epigaea repens* and find that in one, and the smaller patch too, the plants had formed fruit copiously. This patch I feel sure is known to no one else. The other two were both in a scrub-pine grove and may have been disturbed. One of these had no fruit and the other only a few." It would be interesting to examine the flowers in these colonies next spring and see if those in which fruit is scarce are really incapable of producing seed.

Cleistogamous Flowers.—Nearly 650 species belonging to 62 families of flowering plants are now known to produce cleistogamous flowers.

The Loco-weed.—For at least sixty years, owners of live stock in the western half of the United States have annually suffered considerable loss from a disease called "loco." The cause of the disease has been attributed to various plants, usually species of *Aragallus* and *Astragalus* but all efforts to isolate a poisonous substance from these have ended in failure. It was found however, that at least some of the plants were capable of causing the loco disease, and for some time past A. C. Crawford of the U. S. Department of Agriculture has been

conducting numerous experiments to discover the cause of the trouble if possible. A clue was obtained when it was discovered that even the ash of some of the plants was poisonous. A little further search revealed the fact that the substance that produces the disease is barium. This is taken up by the plants in the soil water, and is present in sufficient amount in many specimens to cause "loco." Other plants grown in different regions may not contain the poisonous substance. It is quite likely that the obscure cause of "milk-sickness" may be discovered by means similar to those which have identified the cause of "loco."

NUMBER OF AMERICAN FERNS.—The number of fern species in North America north of Mexico is pretty well-known. At present it is set down at 218. There are also 86 species of *Lycopodiums, Equisetums,* etc., which brings the total number of fernworts in the region up to 300 or more. This by no means represents the entire number of distinct forms, however. The study of these latter has practically only begun but already there is a list which numbers more than 200 and is steadily growing. These added to the true species make considerably more than 500 species and forms in our region. These have recently been listed with their geographical range and abundance given in *The Fern Bulltin.*

THE TUBERS OF NEPHROLEPSIS.—Any one who has grown the sword fern (*Nephrolepis cordifolia*) for any length of time must have noticed the potato-like objects to be found on the underground parts of the plant. According to Prof. J. W. Harshberger, these outgrowths are borne on underground branches and are properly tubers. Most, if not all, the tubers with which we are familiar are storehouses of food, but the tubers of *Nephrolepis* are composed of thin-walled cells filled with water and are therefore more in the nature of cisterns

than storehouses. Water, however, is as much a plant food as is starch, so these tubers, after all, act as food storage organs. The reason they contain water instead of starch is probably due to the fact that *N. Cordifolia* is an epiphyte and therefore more subject to drouth than many other plants. The habit of producing these tubers is common to several species of the genus, notably *N. tuberosa, N. Philippinensis, N. pluma, N. undulata* and *N. Bausii.* Our common *N. exalta* does not produce them.—*Fern Bulletin.*

A PLANT SENSE ORGAN.—The unsentimental botanist is likely to set himself pretty solidly against any suggestion that plants have feelings or nerves, and yet these organisms often behave in ways that are wonderfully like the actions of animals under similar circumstances. The growth of roots toward moisture, for instance, seems dictated by reasoning faculties in the plant, and the circumnutation of plants, by means of which a climbing vine reaches about until it finds something to climb upon is another illustration of allied phenomena. In most cases, however, it is comparatively easy to show that these apparent responses to conscious cerebration are brought about by purely physical processes. One of the more recent discoveries in this line is in connection with the response of roots to gravity. It is well known that the first root goes downward in response to this force and the inference is often made that gravity pulls it down, quite forgetful of the fact that other roots do not grow downward, and that the main root does not do so under certain circumstances. It is found that the root distinguishes gravity by means of certain free starch grains in the cells of the root-tip. No matter in what position the root may be these starch grains fall to the bottom of the cell and in this way indicate the downward direction. This, however, comes exceedingly close to being a sense-organ such as animals possess.

Uses of Grapes.—The most important use of grapes, from a commercial standpoint at least, is in making wine and brandy. Vinegar was also originally made from grapes as its name in the French, "vinaigre" meaning sour wine, indicates. Of course all our raisins are made from grapes, but it is in the by-products made from the waste in wine-making that the remarkable uses are found. The pomace yields acetic acid, and the seeds are fed to cattle and poultry and have even been used as a substitute for coffee. From the seeds, also, a clear yellow oil, similar to olive oil is obtained. The lees of wine, that is, the sediment that settles in the casks of new wine, is rich in cream of tartar and tartaric acid. The tartaric acid of commerce is obtained from this source. Some idea of the importance of this single by-product may be gained from the fact that we import annually from France and Germany two or three million dollars worth.

Fruit Sugar from Dahlias.—We hear frequently of grape sugar, fruit sugar and cane sugar, but the latter is the only one with which the average individual is much acquainted, though he may remember grape sugar as the whitish particles on the outside of dried prunes, raisins and the like. Fruit sugar or levulose is still rarer, the price at the present time being nearly a dollar a pound. Chemically, levulose is similar to the other sugars, containing the same elements, but is sweeter than ordinary sugar. Its great value, however, is in the multitude of uses to which it may be put. It is much more easily digested than cane sugar, in fact is practically in a state to be assimilated by the body, and is suggested as being an excellent food for consumptives and diabetics. It may be used in place of still another sugar—milk sugar—in the preparation of infant foods and used in making jelly, etc., will not crystalize. It is the principal ingredient in honey and a very fair honey can be made from it without the aid of the bee. The great

drawback to its use heretofore has been the cost of producing it, but according to *The Scientific American* a way has recently been found to produce it from the tubers of the dahlia. The thick fleshy roots of this plant contain much stored food not, however, in the form of the familiar starch, but in the form of a closely allied substance known as inulin. This latter substance is similar in composition to levulose and appears to be easily turned over into levulose by the use of weak acids. The process is said to be inexpensive, and since the dahlia can be grown as cheaply as the potato it seems possible that fruit sugar may in time vie with cane sugar for a place on our tables, and since it is more easily digested we are certain to profit by the exchange.

FORESTS AND FORESTRY.—"In the last ten years," says the Yearbook of the Department of Agriculture for 1907, forestry has advanced in this country from an almost unknown science to a useful, growing profession. In that time the number of technically trained foresters has increased from less than a dozen to over 400. Ten years ago there was not a single forest school in the country. Now there are several professional forest schools which rank with those of Europe, and a score more with courses in elementary forestry whose usefulness is steadily growing. Forest lands under management have grown from one or two tracts to many, aggregating 7,503,000 acres, scattered through 39 States. The National Forests have increased from 39,000,000 acres, practically unused and unprotected, to 165,000,000 acres, used, guarded, and improved both in productiveness and accessibility. The number of States which have State forests has increased from 1 to 10; and of those which employ trained foresters from none to 11. The membership of forest associations has increased from 3,600 to 15,800. Ten years ago, except for a few of the foremost botanists, European foresters knew more about American forests than did the people of this country.

THE NAMES OF FUNGI.—The harm that may come to a science through ill-advised changes in the rules of nomenclature, or in following some silly rule designed primarily to cater to the vanity of the individual, is well illustrated in a paper on *Polyporus* put out a short time ago by a New York botanizer. By breaking up the large genera into many smaller ones and giving them new names, the author has been able to add his own name to 332 species out of a total of 409 considered. Most of these plants had been known and described long before he was born, but by a little tinkering with the names, though adding practically nothing to our knowledge of the plants, he now has his name attached to the species forever. C. G. Lloyd naively suggests in *Mycological Notes* that such name-tinkering comes under the head of economic botany since it is by such means that the author secures his salary.

WOODEN FLOWERS.—Nature-faking is not confined entirely to the yellow journals. Just listen to this from a recent number of that model of propriety, the *Ladies' Home Journal*: "They were discovered in Central America some years ago growing in crevasses on the sides of Mount Agua and around the edges of the huge volcano of Fuego in Guatemala. The flower is thus described by one who has seen it: This unique blossom is rough, but beautiful and odd and wonderful in many respects. It is composed of four distinct petals, concave in form, and arranged much like the petals of a half-blown rose. The outside of these petals or divisions is covered with thick bark like an ordinary tree; inside the hard surface is indented with lines that follow each other in the most delicate tracery, like the veins in the petals of some flowers. The flower measures almost twelve inches across and is borne on a light, strong stem of solid wood about a foot long, covered with heavy bark. Stem and flower are dark brown in color and grow on trees of large size." We are quite willing to admit that this flower is

"odd and wonderful in many respects" but it cannot be half as odd and wonderful as the intellect of anyone who will swallow such a silly tale. The story also lacks completeness. It should add that the fruit that follows this flower is a miniature log cabin. Slips of the plant have been sent to Burbank in the hope that he can breed it into a six-room flat with all the modern improvements.

GOVERNMENT AND NATIONAL HEALTH.—The Department of Agriculture spends seven million dollars on plant health and animal health every year, but, with the exception of the splendid work done by Doctors Wiley, Atwater and Benedict, Congress does not directly appropriate one cent for promoting the physical well-being of babies. Thousands have been expended in stamping out cholera among swine, but not one dollar was ever voted for eradicating pneumonia among human beings. Hundreds of thousands are consumed in saving the lives of elm trees from the attacks of beetles; in warning farmers against blights affecting potato plants; in importing Sicilian bugs to fertilize fig blossoms in California; in ostracizing various species of weeds from the ranks of useful plants, and in exterminating parasitic growths that prey on fruit trees. In fact, the Department of Agriculture has expended during the last ten years over forty-six million of dollars. But not a wheel of the official machinery at Washington was ever set in motion for the alleviation or cure of diseases of the heart or kidneys, which will carry off over six millions of our entire population. Eight millions will perish with pneumonia, and the entire event is accepted by the American people with a resignation equal to that of the Hindoo, who, in the midst of indescribable filth, calmly awaits the day of the cholera.—*From Circular of Committee on National Health.*

Color Changes of Flowers.—The fact is well known, at present, that a large number of flowers change color as the blooming season progresses, but the list of flowers that do this is by no means complete and it is desirable that any new instances be put on record. We therefore add the silver berry (*Elaeagnus argentea*) whose four-parted bell-shaped calyces open white but soon turn to a pale yellow. Not only do the flowers turn color as a probable aid to the bees, but they are also very strongly fragrant as might be prophesied of a plant that is nearly related to the sassafras, spice-wood and daphne though not in the same plant family. The silver berry is a plant of our own Northwest and not very well-known to botanists in general but the flowers of the leather-wood (*Dirca palustris*) a species also closely related to this plant, will give a faint idea of their shape. The silver berry is a medium sized shrub and gets its common name from the silvery scales which cover the fruit and under surface of the leaves. Even the young branches are covered with scales that under the microscope are objects of rare beauty.

Flies as Spore Distributors.—The flowering plants have evolved many ingenious schemes for getting their seeds distributed by the wind, water, birds, mammals and even man, himself, but little use has been made of the insects for this purpose, probably because there are so few species of insects that are large enough to transport seeds. When it comes to a transference of spores, however, most of the other agencies except the wind are abandoned and the insects almost exclusively employed. Pollen grains are really spores and these are the spores that insects are usually engaged in carrying, but there are spores still more minute—the spores of plant and animal diseases and these are also transported by insects, mostly flies. Dr. Cobb recently told the Botanical Society of Washington that after some study of the subject he found the ordinary fly-specks to contain the spores of fifty or sixty dif-

ferent kinds of fungi, many of them disease germs that had been taken into the alimentary canal with the fly's food and had not been injured by the digestive process. Flies are well-known to carry numerous germs on their feet and bodies, but now the very fly-specks are shown to be dangerous. There are few wild beasts that are as dangerous as flies.

The Home of Linnaeus.—Although Carl von Linne (Linnaeus) died more than a hundred years ago, his country residence still stands just as he left it with the same furniture, the same pictures on the walls and even the clothing he wore hanging in the closet. It is five or six miles from Upsala and is open to the public. *Mycological Notes* for August publishes a picture of the place reproduced from a souvenir post-card. The house is a long two-story structure of no particular architectural beauty fronting a park-like garden of some extent. Back of the house is a small woodland in which Linnaeus built his museum. This was a building about 12 feet square and at present contains his library, herbarium case and cases for other specimens. The specimens, however, are in the rooms of the Linnaean Society of London.

FIELD BOTANY

Edited by Dr. H. A. Gleason, Urbana, Ill.

Some people labor under the delusion that field work in botany begins in the spring and ends in autumn. Such persons probably go into a sort of botanical hibernation about this time of year and never wake up until the April sun tells them that a new season has begun. Others do no botanical work except read what others have done, and get some second-hand interest and information in that way. But why should we stop our field work just because the leaves are gone? The field is still there, the plants are still there, and it is safe to say that the majority of us know for less about their winter condition than we might easily find out. Let me suggest a few subjects that might be taken up during the winter months, and which will give us a beter idea of the plants about us.

At this season of the year there are a great many dead stems standing, frequently with the remains of the flowers or fruit still attached. How many of them can you recognize. Take some of them home with you from your walks, and, if you can not find out what they are from your manual, press them and visit the same place next summer when they are again in bloom.

Everyone has seen the small rosette-like clusters of green leaves close to the ground, by means of which some plants pass through the winter. Do you know what they are? Why not find as many kinds of rosettes as possible, put a stake by one of each kind, and watch them also next summer? If there are plenty of them, a pressed specimen of each species of rosette would be a good addition to the herbarium.

One last suggestion—why not learn to recognize the different species of trees by their buds, twigs, and bark? You

will be surprised to learn how clearly most trees can be distinguished in this way. If you do not know the tree in the first place, you can get help from most of the many popular tree books, or, better yet, you can watch the trees next season after the leaves appear.

If all towns were like Nauvoo, Illinois, botanizing would be a very easy matter. Last summer Mr. H. N. Patterson and the editor spent about three hours wandering about the sleepy old place, and in that time recognized 116 species of plants growing without cultivation. More that that might be easily found in a three-hour walk across the country, over a variety of situations, but that is a pretty good number to be growing along the town streets. Of the number, 59, or one more than half, were introduced species.

In this department scientific names will hereafter follow the usage of the Vienna Code of nomenclature, as exemplified in the new seventh edition of Gray's Manual. The editor can not personally agree with every principle of that code, but it seems apparent that the best way out of our nomenclatorial difficulties is the adoption of some such general system.

Some Late Flowers, 1908.—The thirty-first of October found me among the dunes north of Waukegan, Illinois. The part south of the pest-house road was a desolate waste, burned over during the early part of the month. The only plants that withstood the burning were the dwarf cedar (*Juniperus horizontalis*) and the bearberry (*Arctostaphylos uva-ursi*) both of which are plants which form dense mats at the surface of the ground. Further north in the unburnt land on the ridges were the tall gaunt stalks of the blazing stars (*Liatris scariosa* and

spicata). In the swales the *Cladium* association was separated from those bordering it even more plainly than in summer.

As I went along the *Cladium* border, there began to appear here and there little star-like specks of blue, just outside of the *Cladium* and extending into the neighboringn association of grasses and rushes. They proved to be the flowers of *Gentiana procera*—single flowers at the tops of tiny plants. These plants were dwarfs about three inches high, with three pairs of very small leaves, which were closely appressed to the stem. The only other flowers that I could find in the sand flats were a few of the yellow flowers of the goldenrod, (*Solidago nemoralis*), which were still to be found on dwarf plants in a few places.

The morning had been cloudy, but just after I reached the bluff at Beach the sky cleared and the sun shone brightly. In about ten to fifteen minutes, close to the open ground, there flashed out spots of yellow. These were of course the omnipresent dandelion, (*Taraxacum erythrospermum*). Deep in the woods along the bluff a few flowers were found on plants of *Aster drummondii* and on one plant of *Aster Tradescanti.* While going under a barb-wire fence I noticed a plantain, (*Plantago Rugelii*), with three blooms among four nearly ripe capsules. Above it on the bluff is an opening in the oak-hickory woods was a clump of willows, the most conspicuous of which was *Salix serissima* with its yellowish-green, nearly ripe capsules, and a few lanceolate shining leaves.

On the way back, I could see from the car window the yellow flowers of witch-hazel, (*Hamamelis Virginiana*), in the woods near Highwood and Glencoe. To complete the list, in my yard at home chickweed, (*Stellaria media*), and speargrass, (*Poa annua*), were also in bloom, making nine flowers in all. —*F. C. Gates, Chicago, Ill.*

EDITORIAL

The present number of this magazine completes its fourteenth volume, a volume which, we are glad to say, has gone to more subscribers than any before it. For the fifteenth volume we bespeak not only the patronage of our present subscribers, but their good will as well which we hope they will manifest by mentioning the magazine to their friends and acquaintances. The new volume will be a good deal like the old one. We shall try to select such matter as will please anyone with a sane interest in plants. Dr. Gleason will continue his department of Field Botany and we expect to add a series of articles on the teaching of botany, but shall not dignify this by giving it a separate department. All in all, we feel confident that we shall put out a volume worth 75 cents to any botanist and we trust our subscribers will agree with us. In this issue we also send bills for the new volume and for any arrears that may be due us. Those who do not find a bill facing the frontispiece may know that their subscriptions are paid up beyond the first of the year.

* * *

During the past year this office received numerous complaints of loss of money sent us in the mails. Usually the missing money was in the shape of bills and coin, but not a few money orders and checks also failed to arrive. It now transpires that our mail was being systematically robbed by the carrier on our city route. This gentleman is now "doing time" for his misdeeds but this will not bring back the lost coin. The cheapest and safest way of sending money through the mails is by bank draft. Anyone having an account at a bank can usually get drafts on New York or Chicago free. Express money orders and postal money orders are also safe but bills

should not be sent in a letter unless it is registered. Postage stamps usually come safely but are liable to disappear in the mails.

* * *

A few weeks ago we received a call from Mr. W. H. Blanchard, the man who undoubtedly holds the world's record for a black-berrying trip. His trip has little in common with those excursions which many of us have enjoyed to the nearest side-hill pasture for a few hours berry-picking on a summer afternoon. It began in early summer in Florida and continued northward as the flowers opened until the turning point was reached somewhere in British America. Then back went the collector to Oklahoma and followed the zone of ripening berries northward. It is safe to say that if Mr. Blanchard was simply after fruit, he could have got more by staying at home, working for fifty cents a day, and buying what berries he wanted; but he was out for quite another purpose. Having become interested in distinguishing the different forms of blackberries, he started out to see them growing. For several years he studied them in New England and for some distance southward, another season he spent in the province of Quebec, and now he has covered more territory in quest of his specimens than anyone ever did before or will do again. But he knows blackberries, now, far better than he ever could by turning over dried brambles in a musty herbarium. What he says about blackberries hereafter will have to be relied upon. Alexander Wilson once made such a journey as this in search of birds, traveling from Maine to the Carolinas mostly on foot, and Pursh, Goldie and many of the older naturalists were accustomed to similar trips. The judgments formed by a man on such expeditions are not likely to go wide of the mark.

* * *

The new "Gray's Manual" has appeared and there is consequently great rejoicing among those who realized that the

6th edition was out of date but who hesitated about using the local nomenclature that more recent works affected. We cannot say that we are entirely pleased with everything in the new book, but it is so much better than anything else, that we purpose making it the standard for this magazine hereafter. The authorities certainly gained a point over other systems when they adopted a nomenclature in harmony with the rules of the Vienna Congress. This also saves us the names of a vast number of species that otherwise would have been changed and as a result the nomenclature of the book has not the unfamiliar look we feared it would have. Nevertheless, there are quite enough changes to make a conservative uncomfortable.. In the matter of keys to genera and species, however, the book is a great disappointment. There is no longer excuse for stringing a key along through several pages of text. The people in New York could have given the authors a great deal of information on the making of business-like keys. A proper key should enable one to practically identify his specimens from the keys alone. The treatment of forms and varieties, too, is extremely uneven. Not only are many mere ecological forms treated with all the pomp and circumstance of varieties (as this book regards varieties) but other and more distinct forms, though called varieties are dismissed with a word or two in the text. It is fairly impossible to discover from the book what conception the authors have of the term. To the credit of the book may be said that the families and orders have been rearranged to harmonize with the latest ideas and more than a thousand illustrations have been introduced as an added help in identifying. These illustrations are not scattered uniformly through the book, but are confined to difficult families such as the cresses, grasses, umbellifers, sedges, etc. We note with approval, too, the retention of italicised words to designate important characters in the descriptions of species, a feature that some recent books have eliminated, partly, we feel sure, because there are some descriptions of "new species" that

would puzzle anybody to italicise properly. Although there has been a considerable increase in the number of species included, and the number of pages has also been increased, the new book actually weighs less than the old one, due to the use of thinner paper. The price has been increased to $2.50, but in our opinion the book is worth it.

* * *

The daughter of the late Mrs. James McManes has given to *Torreya* the sum of two hundred dollars to be used for illustrations for that magazine as a memorial to her mother. No more practical way of advancing popular botany could be devised and *Torreya* is to be congratulated upon its good fortune. We have always been of the opinion that a magazine needing a subsidy to exist has little excuse for being, but given a magazine that can exist without aid, there seems to be no reason why some well-disposed person of means should not adopt the method mentioned above to advance some phase of science in which he may happen to be interested. It will be a great day for science if our millionaires ever exchange their present fads for botany, entomology, ornithology and the like. The editor of this magazine can imagine what fun he would have in making a real botanical journal if backed by about a million dollars to be spent in improvements.

* * *

The new "Gray's Manual" represents a rather conservative treatment of our flora brought up to date. It can hardly claim to be without errors, and anyone who discovers an inaccuracy will do a favor to science by pointing it out. Similarly, if one now finds a plant that is not accurately described in the new work, he is warranted in assuming that he has a species or variety new to our region. Botanizing will now have an added zest. If your new finds do not absolutely correspond to the descriptions it is time to find out why. It is not to be

expected that many more new species will be found by any except the hair-splitters in the region covered by the book, but one may always expect new forms and varieties and should be on the watch for them.

BOOKS AND WRITERS.

Although Dr. Edward F. Bigelow's "Walking as a Fine Art" was issued a year ago, it is not too late to call attention to this excellent little volume which has been compiled from the writings of poets and naturalists in many lands together with original contributions from many well-known writers of the present. The compiler is himself a walker of distinction and has exercised commendable taste in his selections. Several excellent illustrations from photographs add attractiveness to the work.

The second volume of Knuth's "Hand-book of Flower Pollination" has appeared. Some idea of this truly monumental work may be gained from the fact that this second volume contains more than 700 pages, and that two more volumes will be issued before the work is completed. A more extended notice will be given later. The work is being issued by the Clarendon Press at a cost of about $5.00 a volume.

"Nature Study; a manual for Teachers and Students" is the title of a recent book of more than 500 pages by Prof. Frederick L Holtz. As a manual for teachers we can find nothing but commendation for it, but if these teachers, having acquired even half the information that the book contains, attempt to hand out this knowledge to the pupils in their charge, they deserve to lose their positions. As the reviewer sees the matter it is not nature-study but science that Prof. Holtz offers. We do not believe that pupils in the fourth grade can study

pollination understandingly, or that fifth grade pupils should study the flowers of grasses. Nor has the sixth grade any business in the culture of bacteria or the formation of starch in leaves. Other topics which the pupil is supposed to taste before leaving the grades are respiration, digestion, photosynthesis, root hairs and osmosis, stomata, chloroplasts, rusts, smuts, etc., many of them studied with the compound microscope. All these we maintain, belong to the domain of botany rather than nature study. Other topics, suggested more in line with what we conceive to be real nature study, are seed despersal, devices for plant protection, window gardening, study of trees and fruits, the names of plants, etc. The author has intentionally suggested more work than he expects will be performed by any one school, with the idea of giving teachers a choice of subjects, but that many of these subjects are not susceptible of treatment by nature-study methods cannot be too strongly emphasized. The book is equally exhaustive in suggestions for work in zoology, geology and physiology and outlines a year's work in the eight grades for each. Other chapters discuss the motives and educational value of nature-study with suggestions for teaching the different subjects. It is a book that the up-to-date teacher must have and in the hands of a sensible teacher will do much to put this study on a rational basis. It is published by Charles Scribners Sons, New York.

A most interesting little volume designed for making botany attractive to pupils in the grade schools is Dennis' "Nature Study," issued by the Teachers' Journal Co., Marion, Ohio. Prof. Dennis takes as his sub-title "One Hundred Lessons About Plants" and approaches his subject from the natural history point of view. The subjects discussed are adaptations to light, pollination, seed dispersal, adaptation to climate, plant societies, etc., as well as more technical matters such as the structure of stems,

protoplasm, photosynthesis, etc. Numerous suggestive exercises and questions are scattered through the lessons which are further illuminated by more than 150 illustrations. Even adults who would like some knowledge of plant life not comprised in the botanical manuals will find this a useful book to have. The price is one dollar.

"Nature-Study Made Easy" is, as its name indicates, an attempt to simplify one branch of nature—botany—for the lower grades of schools. Much of the text is in story form in which the plants not infrequently hold conversations or express opinions but this is possibly permissible in teaching younger children. There are also a considerable number of poems about plants and numerous illustrations. Like all books of this nature it is likely to add its share toward making the subject of botany interesting. The authors are E. B. Shallon and W. A. Cullen. It is published by the Macmillan Co. at 40 cents *net*.

Some years ago Miss Ida D. Bennett gave us an interesting volume entitled "The Flower Garden" and she has now issued a companion to this in "The Vegetable Garden." Beginning with chapters on the location and plan of the garden we next have the construction and care of hot-beds and cold-frames, seed sowing, transplanting and garden tools. Then follows several chapters on growing staple vegetables, and—somewhat unlooked for in gardening books—directions for preparing these vegetables for the table. The information in this book is such as may be relied upon, and it will no doubt be a most useful book to the average gardener. We cannot help regretting however, that the author did not include in the book, the rarer vegetables, since these are the very ones, the gardener or housewife has most need to look up in the books. Perhaps the author may give us another volume of this nature. There is certainly room for it among gardening books. "The Vegetable Garden" is published by the McClure Co., New York.

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CONTENTS

CONTRIBUTED ARTICLES

REPRINTED ARTICLES

NOTE AND COMMENT

VOLUME 15, NUMBER 1 WHOLE NUMBER 80

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CONTENTS

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THE WALKING FERN.—*Camptosorus rhizophyllus.*

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If thou art worn and hard beset
With sorrows, that thou wouldst forget,
If thou wouldst read a lesson, that will keep
Thy heart from fainting and thy soul from sleep
Go to the woods and hills. No tears
Dim the sweet look that Nature wears.

—Longfellow.

A COLONY OF CAMPTOSORUS.

BY REV. JOHN DAVIS.

AT the close of a fierce mid-summer day, after a weary tramp along the Mississippi bluffs, an eager quest of more than two year's standing was suddenly and happily realized. True, the authorities had said it was by no means an uncommon plant, even if of unequal distribution. Only a few years previous the accomplished editor of *The American Botanist* had written; "Fortunately this fern (*C. rhizophyllus*) is not so rare as the books would have it. Go to the nearest deep, shady woodland; search the moist, but not wet rocks, and when you find a plant with dark-green leaves, and tapering gradually to a slender apex, rejoice."

Admirable advice. There is no trouble about reaching the nearest woodland; none whatever over the rejoicing. But the finding the "plant with the dark green leaves." There lies the rub. Anyway it had escaped my vigilance all this while; and even as it lay before me, resembled rather some common lichen of the rocks to the casual eye, than a coy and rare fern. And all this in the face of the same high authority, who adds:

"There is nothing else, so far as I know, that looks much like it."

Chief of the confusion lies in the published descriptions. From these you would infer that *Camptosorus* was not a walking but a leaping fern; one actually given to botanical stunts. On the contrary, here were spread out on the limestone ledge a mass of rich green fronds, hugging the mossy sward. Instead of leaping or even walking, they were modestly creeping, striking their acuminate points into the loose, scant soil, to become the nucleus of another, and another, and still another growth. Its specific name is a most happy one; a "root-leafing" plant. And equally so its generic title; a "curved-sori" plant.

The colony lay at the base of an exposed cliff of Burlington limestone, about twenty feet from the summit. Naturally hopes were awakened of finding others along the same formation. But in this I was disappointed. Here and there a few neighboring stragglers were espied; but that was all. And subsequent search along the same bluff for miles above and below, as well as along ravines and exposures in the interior, has likewise been in vain. Tracy in his "Flora of Missouri" says that this species is "common everywhere." Such wild conjecture leaves the conviction that there remains much to done in plant life study in the Northeast portion of this State.

This colony covered about three by four feet of area, with an almost solid surface of fronds. Generally the sori are such as are figured in the manuals. But they also appear in large round nodes similar to those of *Dryopteris* or *Woodsia,* heavily coated with a red-brown fuzz. Gray mentions some thing corresponding with this found at Mt. Joy, Penn. Possibly this is the *C. rhizophillus intermedius,* described as a new species in the *Botanical Gazette* (VIII:200. 1883), discovered in Iowa. The books further tell us of a species indigenous to Northern Asia, and one among the Brazilian forests. What

a wide and isolated distribution; the little creeper being a denizen in turn of the arctic, the temperature and the tropic zones!

Some days later I returned to take a negative of my prized discovery. The firmly set fronds offered no resistance to a good exposure, even in a stiff autumn breeze. But it was another matter with the more delicately poised *Dicksonia* and *Cystopteris,* which were disputing possession with *Rhizophillus* for the shade and nurture of the limestone slope.

Hannibal, Mo.

CROCUSES.

By Dr. W. W. Bailey.

HERE in Providence crocuses usually put in an appearance simultaneously with the silver-leaf maple blossoms, but both are very variable in their time of showing. Snow-drops may come a little earlier. We have in certain years, seen all three by Valentine's Day, which everyone knows is February 14th.

No garden flowers surely, and few wild ones, excel these enforced immigrants in vernal charm. We watch for them as a promise of other, though not better, things. Their tenderness appeals to us, while their endurance cheers and enobles. How do they open their satin delicacies to the piercing minds of our spring?

The power of certain plants to resist cold is indeed extraordinary and appears to have little to do with their apparent texture or constitution. One would expect their juices to be congealed at the temperature at which they blossom and perfect their fruit. Take, for instance the delicate seeming chickweed, which the coldest weather does not seem to especially disturb. It will germinate at about the freezing point, and can be found in flower at any time when there is no snow to hide

it. So, too, of the myrial alpine plants that make gay the high places of our earth.

Crocuses are near relatives of the Iris or fleur-de-lis, having a funnel-shaped perianth, with very long tube and a six-parted border. Included within and attached to the floral envelope, are three stamens. The fringed stigma looks almost like a second flower, with its wedge-shaped lobes. The ovary is usually far under ground. We have sometimes dug several inches without finding it. The linear leaves with revolute margins are not quite simultaneous with the flowers.

We associate crocuses with the spring, but there are certain species that are autumnal bloomers. One of these, *Crocus sativa,* yields the saffron of commerce. This consists of the carefully dried stigmas, which are of a deep orange yellow. This substance is used in a variety of ways in painting and dyeing. Formerly it was employed to some extent in medicine and perhaps may be still in the pharmacopeia. In small quantities it is stimulating, and in larger narcotic, a by no means unusual or even novel action. It has been known of many substances since medicine had a name. Hence we confess to impatience when it is trumpeted as a recent discovery.

The true crocus region, the part of the world where it reaches its fullest development is the Mediterranean Zone. The centre of its distribution includes Greece and Asia Minor. We love to think that the Greeks knew these lovely flowers and that may have been in the nose-gay of poor Persephone. In cultivation they easily spread from the garden to the lawn. For ourselves, we would leave them there to set their bright stars in the green firmament.

According to the species we find quite a variety of colors, white, yellow, orange, purple and violet. No really red one is known. As soon as they bloom the bees discover them. Then our cat observes the bees, and following a concatention of cir-

cumstances accordingly, produces a laughable denouncement. Final scene; pussy disappearing over a fence; a bee flying heavenward.

Brown University, Providence, R. I.

THE STUDY OF SEEDS.

By Willard N. Clute.

REDUCED to its lowest terms, the study of seeds in the average high school course in botany resolves itself into an inquiry as to what constitutes a seed, how seeds vary in structure, of what use the various parts are, why plants produce seeds and what conditions are necessary in order that the seed may germinate. There are a great many experiments that may be performed with seeds; indeed one could spend the time allotted to botany for a half year in investigating various points about them, and the temptation is always great to linger in their study, but in any course that aims to give a survey of all the plant parts, such lingering is an error. It is an error, however, into which the new teacher is likely to fall and even the books are not entirely free from the fault commonly giving more attention to seeds than the importance of the subject warrants. In the high school, conditions make it imperative that only the essentials be studied. It is well to eliminate everything, therefore, that has not a direct and important bearing upon the subject in hand.

The seeds of flowering plants, exclusive of the gymnosperms fall into two great groups depending upon the number of their cotyledons. In the monocotyledons there is but a single cotyledon, in the dicotyledons there are two. Since the parts of the dicot seed are somewhat easier to make out, it is best to begin the study with a seed of this type and one without endosperm such as the bean should be selected. But there are beans and beans. The lima bean, which may be bought at the grocers, is as good as any, but the seed of the

scarlet runner (*Phaseolus multiflorus*) has several points of interest, chief of which is the fact that its cotyledons do not come out of the soil in germination. They may be planted at the very surface of the soil and will afford excellent objects for comparison with other kinds of beans. Horse beans (*Vicia faba equina*) do not seem to be of any greater value and are not always easy to obtain. Although we have cautioned the teacher against wasting time on seeds, the introduction at this point of a different seed exactly like the first in structure cannot be considered time lost. The beginner learns slowly and needs to get the structure firmly in mind. When he understands the make-up of the bean embryo he may be given a dicot seed with endosperm, such as the castor-bean. This may be boiled a few minutes to soften the parts. In all beginning work it is difficult to get seeds that are large enough to meet the requirements of the clumsy novice. It is therefore suggested that in ordering costor beans the variety *zanzibarensis* be specified. If a second example of a dicot seed with endosperm is wanted the four-o'clock seed may be used. The morning-glory seed often recommended is rather too small for good work with high school pupils. The castor-bean and four o'clock have one drawback—they lack a plumule. A seed which will show all parts of the embroyo in addition to the endosperm is that of the honey locust (*Gleditschia triacanthos*). It is also large enough to enable the beginner to see all parts clearly. A seed of this type should certainly be used. They may be purchased from J. M. Thorburn & Co., New York, or collected from the trees themselves. They are to be found in most localities. Boil for a few minutes before using.

A grain of corn is the time-honored illustration of the monocot seed; in fact it would be difficult to get another half so good, size and clearness of structure considered. It presents no special difficulties except to the few sticklers for exact-

ness who are careful to insist that this and the four-o'clock "seed" are really fruits. Of course they are, but there is no use bothering the beginner with the information. He has enough to do in keeping his ideas of essential structure properly classified. For the same reason, it does not seem desirable to introduce the polycotyledonous seed of the pine. This is frequently recommended in the books, but it only serves to confuse the pupil. In college study where the students are older it may well be introduced. The pines are a small part of a small division of the plant world known as Gymnosperms. They are not true flowering plants as the world regards flowering plants and the general study of seeds no more calls for their study than the study of leaves calls for a study of fern-leaves and the study of flowers calls for a study of the sporophylls of *Selaginella*. If one must have pine seeds however, several kinds may be obtained of Thorburn. The largest—and hardest—are those of *Pinus pinea.* In the large cities one may often obtain the seeds of *Pinus monophylla* at the fruit stores.

To the writer it seems a waste of time to bother the pupil with anything about the raphe and chalaza until he has a natural understanding of these parts. The same cannot be said of the micropyle, hilum and possibly the seed-stalk or funiculus. Some seeds have a second seed coat, the tegmen, but no attention need be called to the fact, unless the pupil happens to discover it. If one wants to see how important the tegmen is considered, he may spend a little time trying to find a mention of it in the indices and glossaries of scientific texts. There is a good reason for calling the stem-like part of the embryo the caulicle (little stem) instead of the hypocotyl, and equally good reason for naming the food-store outside the embryo the endosperm instead of the albumen. If pupils are required to color similar parts of each drawing alike—say, white for the canlicle, green for the plumule, blue for the

cotyledous and yellow for the endosperm—it will serve to bring out those structures more clearly. The colors suggested are those that the plantlet usually wears in these parts or the colors they usually assume when tested for foods.

The foods stored in seeds may consist of starch, sugar, oils, cellulose and proteids. The well-known iodine test is best for starches. Pupils may scrape a few cells from the cotyledon of the bean and by treating with iodine solution see with the microscope the starch grains in the cells for themselves. Proteids will reveal themselves if treated with a drop of nitric acid followed in a few minutes with a drop or two of ammonia. They will also turn a rose, or dull red if moistened with Millon's reagent and heated. The acid test is probably as good as any. Oils will leave a permanent spot on clean white paper when parts containing them are pressed upon it. The seeds may also be ground up, the oils dissolved out with ether or chloroform and obtained by evaporating the solvent. Oils also turn black if treated with osmic acid, and red if tested with an alcoholic solution of alkamin. Sugar and cellulose in seeds may be disregarded. The reserve food in the date is cellulose, but it is not essential that it be tested. Cellulose turns blue if moistened with iodine solution and then with strong sulphuric acid diluted with half its bulk of water.

In investigating the question of what seeds need in order to germinate, it does not seem worth while to perform experiments to see if plants need warmth. Every pupil with enough brains to understand botany knows that plants will not grow in the cold. If it is desired to know at what temperature seeds will germinate, it will need a long series of experiments before we can generalize, for seeds are not alike in these requirements. Maple seeds are reported to be able to grow on a cake of ice; peas will grow with a very small increase in temperature above the freezing point, but corn and tomato will not. The fact that seeds need warmth is familiar to all. That

seeds need moisture for growth is also familiar from everyday experience. Certainly it is a waste of time to perform experiments in this line with high school pupils. As to seeds requiring air for growth, the case is different. Few people have any very exact ideas on this subject. To show that seeds make use of the air some germinating seeds may be corked up in a bottle and after 24 hours the air in the bottle may be tested with a lighted splinter. If it goes out, we may assume that the oxygen has been replaced by carbon dioxide. That this is so can be proved by pouring lime or baryta-water in the bottle and shaking. It will become milky. A bottle with seeds of the same kind but not germinating should be set up and treated like the other as a control. This does not prove that seeds *require* air, but it may be assumed. An experiment to show that the seeds will not grow without air may be set up by teachers who have an inclination to push the inquiry to the end. A few seeds germinate slowly or not at all in the light. The larkspur and poppy are reported to be in this class. On the other hand some mistletoes and other epiphytes will not germinate well in darkness. The fact that most seeds are planted too deep in the soil to receive light, should dispose of this question as a general proposition without an experiment.

THE PLANTS OF OUR HILL.

By Catherine Harrison.

"I STOOD tiptoe upon a little hill" and saw—thorns and mulleins and cows. Oh, yes! I saw the polygala, too. Think of it! I had lived at the foot of the hill for more than a dozen years, and had climbed to the top more than a dozen times each year, and had never before found anything worth mentioning—except cows.

It was the polygala that opened my eyes. For the hill was not really so commonplace as it seemed, of course not. It

was just my obstinate way of looking at the thorns and mulleins that kept me from seeing the really beautiful and rare things. However, that bed of fringed polygala simply insisted on being seen and so I had to look. The little pink-purple blossoms were everywhere. They fairly elbowed each other out of the bit of woods where they properly belonged and held up their impudent little faces in the open pasture beyond, along with the cows and mulleins. I followed them as far as they had dared to go and picked with discrimination and moderation with determination against extermination.

While I was gathering them I stopped to pick a few violets. What a deep color they had; what odd little leaves, so purple beneath; and what large blossoms. Surely these were no common violets. I would "look them up" when I reached home. So look them up I did, and found (according to Britton and Brown) that my plant was the "southern wood violet" (*V. villosa*). My new Gray's Manual, however, was completely silent on the subject, although in an old and coverless volume I found "*V. villosa,* probably a round-leaved form of *V. sagittata.*" Turning again to the later edition, I found *V. sagittata* often passed in to *V. palmata* var. *cucullata.* Poor innocent little violet, that can't find a name for itself among all those words. I wonder what it really is, don't you?

Besides these puzzling violets, my bouquets contained many of the ever present, faded-looking, dog violets, which I thought hardly worth carrying home. Still, I decided to find out all I could about them. Perhaps they would amount to more than I supposed. "Why look—there are two kinds! I never knew before that there were two kinds of dog violets, except the albinos that I occasionally find." Nor did I know it then. However, I was very soon to know that two-thirds of my "dog violets" were long spurred violets (*V. rostrata*), of which Gray condescends to say, "Rather rare."

Violets, though, are not the only flowers to be found on

our hill. Where do the bluest hepaticas grow? Where, the pinkest wild roses? And for that matter ,the largest hickory nuts? On our barren thorn-infested Hill, of course. Nor are these all. Adder's Tongues (*Erythronium Americanum*) grow there on top of a great rock where any ordinary adder's tongue would not think of growing. Early meadow rue spreads the most delicate green drapery imaginable over the loose stones which compose the greater part of the soil. The pyrolas under the black birch, simply compel one to look at their glossy leaves. So far as I know, they have never blossomed; but that is all the more exciting, for I must keep close watch so as not to miss them if they ever do. At every turn one may see miterworts and false miterworts, cinquefoils and bellworts, solomon seals and twisted stalks and many, many others. Common things? Yes. But interesting, since they grow where cows and thorns are supposed to hold sole possession. Besides these, he who knows where to look, may even find a single sickly but precious specimen of the much sought ginseng (*Aralia quinquefolia*).

Ferns, too, have a place on Our Hill. Polypodies, ebony spleenworts and bladder ferns may be found in more than one place, while shield ferns are taller, broader, and darker green than I have ever seen them elsewhere. Broad beech ferns are abundant on Our Hill, which is their only station for miles around. Of the grape ferns (*Botrychium*) four kinds have been found, including the rare little *B. simplex*. However, I suppose there is probably good reason for its growing on our seculed Hill, it was probably trying to run away from its name (which being bigger than the plant itself, is enough to frighten it from ordinary localities) and so took refuge in our mullein patch. But it couldn't escape that way, for I found it and tagged it with enough Latin to last it the rest of its days.

Yes, Our Hill produces better things than thorns. Does Your Hill? Perhaps you think your locality is too common-

place; that only weeds grow there. I *knew* Our Hill was so—before I saw the polygala. Maybe you, too, are mistaken; go and see. Go again; and again and yet again. Before long you will find something worth having. Why, only this month (Nov.) I found two new plants one of which was an orchid, or rather the dried remains of one. It was a common one, to be sure. A coral boot, *C. odontorhiza* I think, although I was unable to determine exactly, since I had only the dried stalk and seed pods to examine. Yet what a discovery! The first Orchid on Our Hill!

So persevere and you will find treasure after treasure. Perhaps not just those I have mentioned but something precious and probably more beautiful. And remember this: although you may find only a few plants of a kind, let that encourage, not discourage you. For if there are only a few of a kind, think how many more kinds there is room for.

Wellsboro, Pa.

SOME MIDWINTER MOSSES.

By H. S. Hammond.

ON January 26th, the writer in company with some friends, took a short tramp out to Brownfield's Woods which are situated about 3½ miles northeast of the Urbana Court House, Champaign Co., Ill. These woods are practically virgin timber, cover about fifty acres of rolling ground; the soil being deep rich leaf mold, excepting for some sandy soil along the banks of the Salt Fork of the Vermillion river which drains this area.

The principal trees in the this area are maples, oaks, elms, hickories, honey locusts, basswood and horsechestnuts. Scattered about on the forest floor are many dead and rotten logs many of the latter partially covered by the soil. The principal shrub is spice-bush (*Benzoin aestivale*).

Under such condition one would ordinarily expect to

find several varieties of mosses but only the few following varieties were found:

Orthotrichum Ohioense S. & L. was found growing in its characteristic dense yellowish-brown to greenish-brown patches at the base of the trunks of the trees, especially where the trees stood somewhat apart. The plant is rather difficult to identify without the calyptra being present; but the genus includes many of those species commonly found on the bark and at the base of trees.

Dicranella heteromalla (L) was found along the shady and somewhat sandy bank of the stream. This is easily identified by its yellowish seta, which becomes darker and twisted with age and the oblong to oblong-ovoid calyptra which becomes brown and furrowed when dry and empty.

Mnium sp. was also found. These three species were all the acrocarpus species gathered from that locality.

Among the pleurocarpus mosses were:

Thuidium recognitum (Hedw.) the common fern moss which was found growing on some of the rotten logs. This moss gets its name from the method of its branching which closely resembles that of a fern pinna. It is one of our most beautiful and delicate Illinois mosses.

Hypnum imponens (Hedw.) was found growing in the characteristic prostrate attitude in dense mats on rotten wood in shady places. This species is quite dark green in color with capsules nearly erect and symmetrical.

Amblystegium serpens (L.) the common creeping hypnum was more or less common on rotten wood in the shadier places. The whole plant forms but a thin covering over the rotten wood upon which it is found.

Other species of pleurocarpus mosses were also found but the writer has been unable to identify them on account of the specimens at hand having no fruiting forms present.

Univ. of Illinois, Urbana, Ill.

WILD VIOLETS.

THE first days of April usually bring into bloom upon our wooded river hills the round-leaved violet, earliest of its charming tribe. The dainty yellow flowers, streaked within with brown, look like jaunty little bonnets, and are a pretty sight amid the dun litter of the woodland floor. So eager are the blossoms for a bath in the spring sunshine that they are wide open before the leaves are grown. The latter emerge quite leisurely from the mellow earth, rolled up like quills; but once started, they grow wondrously, and in summer will be found from three to four inches broad lying sleek and glossy, flat upon the ground.

It seems to me that Bryant must have had this earliest of violets in mind when he wrote those familiar lines of "The Yellow Violet":

> Ere beechen buds begin to swell,
>   Or woods the bluebird's warble know,
> The yellow violet's modest bell
>   Peeps from the last year's leaves below.

The books, however, are disposed to award that honor to another woodland beauty, the downy yellow violet, which I usually do not find in my woods until two or three weeks later, after the trees are in leaf and "the bluebird's warble" has been heard. The blossoms of this later yellow violet are shyly hid amid the abundant leafage which clothes the plant's stems, and this calls attention to the fact that some violets have leafy stalks while some bear their leaves all in a cluster on the ground at the foot of the flower stems.

Bearing this simple fact in mind, we shall begin to notice that there are many varieties of wild flowers in our woods and fields. The common blue violet of the roadsides and meadows, for instance, has leaves only at its root, while an almost equally common one, though smaller and paler, is leafy

stemmed. The latter is the so-called dog violet—a term of contempt which has come to us from England, and was given because this species (which grows there too) is lacking in the fragrance that is so much cherished in the common sweet violet of the Old World. As a matter of fact, in this country, the wild violets have not as a rule any noticeable perfume. The sweet white violet, however, whose charming little blossom brighten damp, shady meadows and mossy banks of woodland streams, has a delicious, though delicate, fragrance. Rarely is a posy from the fields more acceptable to one shut in than a handful of these dainty flowers. Their sweetness is too fleeting to cloy, but quite enough to awaken dormant memories and bring back to the sick-room some happiness of other days.

Hardly less interesting than the blossoms of violets are their leaves, and they are even more various. In some cases they undergo complete transformation as the plant grows old. Thus the early leaves of the common blue violet of the fields are roundish, with their sides rolled inward, while the later leaves are cut and divided into such fringes and lobes that one would not suspect them to have sprung from the same root. In other caess the leaves have marked shapes at the start, and these give to the varieties their special names. Of these may be mentioned the lance-leaved—a white violet, common in damp soil, with erect leaves, shaped like lance-heads; the bird-foot, frequent in sandy places, having leaves cut into four or five narrow divisions, like the claws of a bird; and the arrow-leaved, with foliage shaped like arrow-heads, the barbs often beautifully toothed and fringed, as though nature took delight in putting a special loving touch to a weapon that could harm no one.—*C. F. Saunders, in Young People.*

NOTE AND COMMENT

Wanted.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their shorter botanical items. The magazine is issued as soon as possible after the 10th of February, May, August and November.

Peat Bogs.—Possibly it has never occurred to those who live in regions where peat bogs are common that this feature of the earth's surface is not a general one. It is known, however, that such bogs are characteristic of glaciated regions and that by far the greater number are found north of the line which marks the southern limit of the old glaciers, and mostly in the northern hemisphere. Any piece of wet ground is not entitled to be called a bog. A real bog is wet and springy, to be sure, but it is underlaid with peat and vegetable remains and covered on the surface with sphagnum mosses. The saturated soil prevents the entrance of air and thus decay goes on very slowly and imperfectly forming the black deposit known as peat. The presence of ulmic and other acids prevents the growth of the bacteria of decay and this results in the preservation of anything that falls into the bog. In the Old World a great number of articles have been preserved in this way and found after hundreds of years in good condition. Among them may be mentioned, armor, weapons, clothing, various household utensils, and even the bodies of men. Examination of the peat itself reveals the remains of more than ninety species of plants that have been preserved in a recognizable condition. The living vegetation of the peat bog is found to be made up

of a number of characteristic species, such as the buck bean (*Menyanthes trifoliata*), sundew (*Drosera rotundifolia*), pitcher plant (*Sarracenia purpurea*), small cranberry (*Vaccinium oxycoccus*), marsh rosemary (*Andromeda polifolia*), leather leaf (*Cassandra calyculata*), pale laurel (*Kalmia glanca*), Labrador tea (*Ledum Groenlandicum*), creeping snowberry (*Chiogenes hispidula*) and larch (*Larix Americana*). The bogs are regarded as having existed since the glacial period and the flora is supposed to represent the plants of that far-away time. In wet grounds that have originated since the glacial period a very different flora exists. Some of the representative species being cat-tails (*Typha latifolia*), button-brush (*Cephalanthus occidentalis*), dogwoods (*Cornus*) various sedges (*Carex*) and smart-weeds (*Polygonum*). An extended account of the nature and origin of the bogs may be found in the *Plant World* for February.

COLOR OF FERN SPORES —Fern students seldom trouble themselves about the color of fern spores though familiar with the changes of color that the sporangia go through in the process of ripening. The spores are by no means the rusty-brown objects that some may be led to think they are from a hasty glance at the spoangia or sori, in fact although brown is the prevailing color, there is quite a range of color outside of this that the spores may adopt. According to "The Book of Fern Culture" the spores of the *Osmundas* are bright green, in *Pteris argyrea* they are quite black. In most of the *Davallias* the spores are yellow, in some of the *Gymnogrammas* they are nearly black while in a few *Adiantums* they are pale yellow. The shapes and markings of fern spores are subjects that as yet have been practically untouched though in allied plants, as the *Isoetes,* these points may serve to distinguish species. A study of fern spores would be a most interesting pastime for those who have a compound microscope.—*Fern Bulletin.*

FORMS OF THE ARROW HEAD.—The common arrow-head is a well-known and variable plant. It was for many years known as *Sagittaria variabilis* but more recently is called *S. latifolia.* When it was known as *S. variabilis* a large number of the more striking forms were named as varieties and when the craze for hair-splitting began it was inevitable that many of these should become new species. Two closely related forms were described in 1894 as *S. Engelmanniana* and *S. longirostra,* respectively and many botanists have since considered them distinct species, but last year K. K. Mackenzie discovered at Forked River, N. J., a lot of specimens in which the distinctive characters of the two forms are so blended that he is constrained to believe the two to be but forms of a single species. Thus does another species become extinct. Not the least remearkable fact in this connection is that the reduction was made in *Torreya.*

CEREUS GIGANTEUS.—The New York *Sun* recently contained the following: "Since the giant cactus, which is by far the most impressive feature of the desert vegetation of the Far Southwest, was studied and named by Dr. George Engelmann in 1847, it has been known to botanists as *Cereus giganteus.* Now Dr. L. N. Britton and Dr. J. N. Rose of the New York Botanical Garden have found that it is not a cereus at all, but belongs to a separate genus of which it is the only species. They propose to name the genus *Carnagica* in honor of Andrew Carnegie." Commenting upon this *Horticulture* of Boston observes, "Undoing one another's work has long been a passion with many of our esteemed friends, the botanists, and genus and species splitting their ever-besetting sin. The establishment of this monotypie genus in honor of the Laird of Skibo looks questionable. With all due respect to the learned gentlemen mentioned in the above extract, we are disposed to credit Dr. Engelmann and our German contemporary, Schumann, with a better knowledge of the spiny

inhabitants of the desert than even our New York and Washington scientists. We know of none who have done more devoted and painstaking work on the Cactacae and Coniferae and allied plants in America than Dr. Engelmann and it is regretted that the name given by him should not be permitted to stand." *Horticulture* should remember, however, that Dr. Engelmann is dead and gone, while Carnegie is still alive, has great wealth and is credited with an inclination to "loosen up" for anything that will add to the fame of Andrew C. It will be nothing short of ingratitude if Andrew does not do something handsome for botany in return for his "honors." But we submit that we all ought to share in the returns—all but the college professors who can get at him through the pension fund. To begin with, how would it do to subsidize all the botanical and horticultural publications?

The Study of Seeds.—It is suggested that we recognize different species of trees by the buds, twigs, and bark. I should like to add seeds, also. The study of seeds is very helpful in identifying new species of plants. To illustrate. On one of my botanizing trips, I gathered a little plant, not more than two inches high having one tiny flower. It was rolled up with many others and carried home. After many weeks an attempt was made to analyze it. The flower was gone, the plant shriveled almost to nothing. Under the magnifying glass one minute seed was found, and at a glance the marking on that little seed told beyond a doubt the family to which it belonged. "The family resemblance" is very strong in all species of a family. Being familiar with the shape and marking of one species it will act as a key to the other species of that family. My collection consists of several hundred kinds of seeds and is a source of great pleasure as well as profit. I would like to encourage all students of botany to make a study of seeds, and a collection of them.—*Mrs. Emma Buszek, Orange, California.*

Leaf Shoots.—This is the term which Conard adopts in his "Structure and Life History of the Hay Scented Fern" for the curious stems that arise from the base of the stipe in the fronds of *Dicksonia Pilosiuscula.* According to this author about twenty percent of the fronds produce such roots. Occasionally a stipe will produce two shoots, one on each side. These shoots have a varying history; they may remain dormant as mere bud-like protuberances or they may grow rapidly into true rhizomes from which new fronds develop. This method of vegetative reproduction is rarely mentioned in discussing the multiplication of ferns by other than sexual processes, and seems confined to this single species in our fern flora.—*Fern Bulletin.*

Cultivating the Lilies.—Of all the families of plants that man cultivates for the beauty of their flowers, few if any, are more desirable than the lilies and irises. The orchids bear very beautiful flowers but are hard to grow, while the lilies and irises are of easy culture and hardly surpassed by the orchids in beauty; in fact, the iris is called "the poor man's orchid." It is surprising what a fine collection can be made when one really sets about it. Mr. Gustav Pauls of the St. Louis Altenheim writes that he has been growing these plants for nearly fifty years and has eighty varieties of lilies, besides *Camassias, Erythroniums, Fritillarias Tricyrtis, Calochortus Brodiaeas* and others. Few plants are more satisfactory than bulbous plants of all kinds. Once established under proper conditions they require less care than other plants and continue to improve as time passes.

Saprophytes and Parisites.—Saprophytes among plants are defined as individuals which live upon dead organic matter, whether animal or vegetable, while parisites live upon living animals or plants. The best examples of both these groups are found among the fungi, in fact recent research incline the scientists to the belief that saprophytes and parasites

are almost entirely confined to this group. The Mistletoe was once called a parasite, but this plant has more or less chlorophyll and thus is partly self-supporting. Such an association of plants is more properly described as a low case of symbiosis in which each plant gains something from the partnership. A more pronounced case of symbiosis is found in the association of the clover and a species of bacteria which inhabits small nodules on its roots. Here the bacteria take up nitrogen for the clover and are repaid by elaborated food from the latter. The Indian pipe is a plant frequently described as a saprophyte and in the same class were formerly placed the coral-roots, broom-rapes and many others, but it now appears that all these plants have formed partnership with certain low fungi called mycorhizas, which inhabit the outer layers of the roots and absorb plant food from the soil, and thus both the fungi and flowering-plants are true symbionts, each contributing something to, and gaining something from, the partnership.

PITCHER-PLANTS FOR SCHOOLS.—In many localities where botany is taught it is often a difficult matter to secure from the surrounding region, material to illustrate the so-called insectivorous plants. The bladderworts (*Utricularia*) are likeliest to be found, but their small size makes them unsatisfactory. The pitcher-plants are best for cultivating in pots in the school-room and four different species namely, *Sarracenia purpurea, S. flava, S. Drummondii* and *S. psittacina,* may be procured for 15 cents each from F. H. Horsford, Charlotte, Vt., at any time of year except in the height of the growing season. The small cost of the specimens makes it possible for every teacher of botany to add a most interesting and attractive feature to the school-room. The sundews (*Drosera rotundifolia* and *D. intermedia*) and the venus' fly-trap (*Dionea muscipula*)also grow well in the school room and may possibly be obtained from other dealers.

Fern Mycorhizas.—There is a growing list of plants known to botanists in which the older parts of the root are inhabited by threads of fungi which act like root hairs in securing food materials for the plant. Such associations are known as mycorhizas and are quite common among the heaths, conifers, orchids and many others. Among the true ferns, however, at least among the Polypodiaceae, mycorhizas have until recently been unknown, though it is possible that they will be found to be not uncommon when the roots are more extensively studied. At present the only member of the Polypodiaceae known to have mycorhizas is the boulder fern (*Dicksonia pilosiuscula*), although a species of *Cyathea* has been reported in a rather indefinite way as possessing them. —*Fern Bulletin.*

Wooden Flowers.—This morning a friend of mine sent me a copy of your number 79, November, 1908, vol. 14, No. 4., marking your article on page 115: "Wooden flowers." He sent it to me, because I have been living in Guatemala for 31 years, and have been occupied in botanical work. Permit me a few words (if the article has not been rectified by anybody previously). The wooden flower exists. I am willing to furnish samples of it. I have none now on hand, but can procure them from Guatemala. Only it is not a *flower,* but *Gallenbildung* (I cannot remember now the English word), as far I can judge, caused by the sting of an insect—may be a fungus, but I rather think insect. The description, locality etc. in your article page 115 is quite correct. Generally the "roses" are 4-5 inches in diameter, but exceptionally beautiful specimens reach the 12 inches mentioned. I never have collected it myself, but it is to be bought, for a few cents, from indians, coming from the Volcanoes, in the streets of Guatemala.—*H. von Turckheim, Bachstr,* 40. *Karlsruhe, Baden.* [We are much obliged to our correspondent for explaining the reference to wooden flowers, and thus verifying our implied denial that

such a thing as a real wooden flower exists. There are, of course, many curious and fantastic objects in the plant world due to mal-formations produced by the attacks of insects and fungi and we can well believe the wooden flower to be one of those, but a real wooden rose—never! In a later note our correspondent writes that there is a picture of the "wooden flower" in Engler and Prantl's "Naturlische Pflanzenfamilien" III, 1, p. 161 fig. 10713. According to Engler it is caused by a parasite, a *Phoradendron*.—*Ed.*]

YELLOW HOLLY BERRIES.—We have received from Mrs. G. W. Sirrine, Greenville, S. Car., some very fine specimens of the yellow fruited holly. This is not a species distinct from the red fruited form, but is simply a variety of it, due to the fading out of the pigment which colors the berries. In most fruits this pigment is anthocyan. A superabundance of this may cause fruits to be nearly or quite black and a small quantity may allow the fruits to become yellow. This fact is so well known that no botanist is surprised at finding a yellow form of a red flower, or of a red fruit. Similarly it seems quite possible to breed up red flowers from yellow ones, especially those yellow ones which have spots or streaks of red in them to start with. The old-fashioned tawny day lily (*Hemerocallis fulva*) is of such a peculiar shade of brick red as to possess little attraction for flower-lovers, but it seems quite possible to extract from this species a flower with only the deeper tints of red and in such a case the flower would doubtless take a sudden jump in popularity. It would be interesting if someone would make a list of red flowers with yellow varieties and other lists of red or black fruits with forms in which yellow predominates.

FIELD BOTANY

Edited by Dr. H. A. Gleason, Urbana, Ill.

It is at this season of the year that the field worker begins to look forward to another season of out-of-door activity and to lay plans for a new campaign. Judging from the letters that have come in to this department, it seems that many of its readers are preparing to make a collection of plants, and it is to them that these suggestions are especially directed.

There are all sorts of presses that may be used, from a piece of board with a rock on it to the elaborate frames offered for sale by several firms. There is no need of using as cumbrous affair as the former, or of paying two or three dollars for the latter, when an expenditure of a few cents will make a press more satisfactory than either.

The theory of pressing plants is simple; the plant is flattened so that it ocupies less space, and is held in that position until it is dry. The press must be designed to serve efficiently for both purposes of flattening and drying. The old-fashioned method of using weights is simple and has the advantage of subjecting the plants always to a uniform amount of pressure, but it is unwieldy and clumsy and in its usual form retards the drying process. Straps buckled around a press are light, but are adjustable only to certain buckle-holes. They also wear out rather quickly and are comparatively expensive. The press here described has the advantage of cheapness, lightness, and ease of operation. It has been in constant use by myself for eight years, and everyone who has tried it has adopted it.

Provide some lath or, better, the dressed strips used for making lattices, about 1½ inches wide by ¼ inch thick. Cut

six pieces 12 inches and four 18 inches long. Nail together to form a frame 12 by 18 inches; have the heads of the nails on the 18 inch strips and clinch them on the other side. Two frames will be needed for each press, which should contain not more than 25 sheets of plants. For each press get two cords (sash-cord or heavy fish-line 3-16 inch thick, I prefer the latter) with a three inch loop at one end (not a slip-knot) and four feet long.

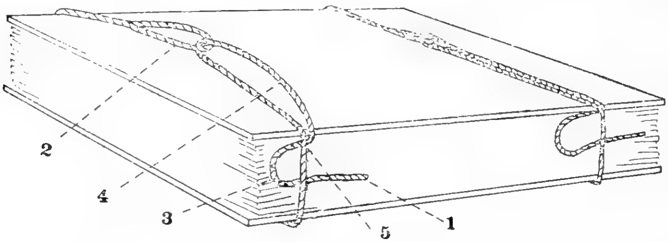
A supply of driers is also needed, and fifty should be on hand for each press. Their function is the absorption of water from the fresh plants, and it is important to have them as absorbent as is consistent with expense. Blotting paper may be used but it is expensive. The ordinary material is carpet-paper, costing 5-10 cents per square yard. There are many grades in the market and care should be taken to select a suitable one, soft, not too thin, and not treated with tar or some other prepartion. A sample will be sent to anyone on request. Each square yard will cut into six driers 12 by 18 inches.

Folders are needed in which the plants are placed during pressing and where they remain until they are completely dry. Newspapers are as satisfactory as anything. Cut the sheets 16 by 22 inches and fold once to 11 by 16 inches.

Having collected the plants in good condition, lay a frame on the table with the 18 inch strips *down;* on it place a drier and on it a folder. Inside the folder arrange the plant in as natural a manner as possible. Smooth out some of the leaves, see that some of the flowers will be pressed open, but do not waste too much time trying to make "pretty" specimens. If the specimen is too long for the paper, bend it sharply (not in a curve); in this way plants up to 48 inches long may be pressed entire. Add another drier, another folder, and so build up the pile. Place not more than 25, or at most 30, plants in one press. Thick stems may be split before pressing,

and heavy roots and tubers may be halved and most of the tissues removed, leaving only the outer surface. If the leaves are too numerous to press well trim off some, leaving a small basal portion to show their former presence. Thick, heavy heads of flowers like those of wild sunflowers may be split, but are better if pressed entire, surrounded by one or more ring-shaped thicknesses of drying paper. This keeps the other parts flat and prevents crushing the heads. Do not omit to place in each folder a label, showing the date and place of collection and something of the habits of the plant.

After the pile is complete add another frame with the 18 inch strips *up*. Place two cords around the frame, one about 3 inches from each end, with the loops just appearing on the upper side, and fasten as shown in the figure. Slip the free end (1) through the loop (2). Loop the free end remaining



under the cord at the side of the press (3). Stand on the press and tighten 4 as far as it can be pulled. Pull 3 to to take up the slack in 4 and draw 3 up firmly between the edge of the press and the cord at 5. The pressure will hold it securely without a knot, the press may be moved easily from place to place, and may be opened instantly by pulling on 1.

Place the presses in the sun or in a warm dry place. After 24 hours change the wet driers for fresh ones, leaving the plants undisturbed in their folders. Spread the wet driers out in the sun to dry; a sidewalk is a good place, and they will dry in an hour on a hot day. Repeat this process daily until

the plants are dry. This may be determined by the sense of touch or by their becoming stiff and brittle. The time required for drying will vary from 3 to 7 days, depending upon the plants and on the weather. Store the specimens in the original folders in a dry place. until they are ready for mounting.

A Freak Dandelion.—While collecting near Iowa City last spring I chanced upon a form of *Taraxacum taraxacum* (L.) Karst, so abnormal as to deserve mention. In place of the scape which all self-respecting dandelions rear aloft, this "freak" had a stem, amply provided with leaves—not in whorls, if you please, but alternate. The tip of the flower stalk was bifurcate and bore two heads, rather smaller than the average but perfect in other respects. Near the base of the stem to still further emphasize the abnormality was an auxillary peduncle tipped by an inmature head. There were several plants with this leafy stem habit and all very similar in the forked flower stalk. The soil was an ordinary black earth quite moist but in no way noticeably peculiar and six feet away in the same soil were normal plants of the same species. A friend, who is somewhat severe in his strictures regarding the activity of taxonomists and the resulting multiplicity of synonyms, suggests that I describe this form as a new species and call it *T. paradoxa.* However it may be of interest to some to know that *Taraxacum taraxacum* (L.) Karst. (*T. officinale* Weber. *T. Dens-leonis Desv.* etc., etc.,) does not always have a scape nor is its inflorescence always a single head. —*M. P. Somes.*

EDITORIAL

Any of our readers happening to have a few hours to spare in Chicago, will find the time well spent in a visit to the conservatories in Garfield Park. It will be a surprise to many to know that these conservatories are the largest in America and only excelled in the Old World by the glass houses at Kew. Having seen the conservatories at New York, Boston, Washington and other large cities we are satisfied that they are not to be mentioned in the same breath with the Garfield Park houses in point of size and arrangement. This being only the second season for the conservatories there is much still to be desired as regards the size of specimens but this defect will be remedied by time. One feature that we do not recall seeing elsewhere, is a cool house devoted entirely to coniferous trees arranged in a very attractive way. The fern house is the gem of the entire collection. Here fern-clad cliffs surround a small lake fed by springs and filled with lilies and other aquatics. The glass houses in Lincoln Park have long been famous but must now take second place.

* * *

When Dr. E. F. Bigelow recently took the presidency of the Agassiz Association everybody felt that the development of that institution would not proceed along conventional lines and they have not been mistaken. Dr. Bigelow bristles with unique ideas that are likely to make people interested in naure-study sit up and take notice. His latest venture is "Arcadia" a collection of portable buildings in Stamford, Conn. in which he purposes carrying on various experiments connected with the work of the Agassiz Association. The funds for this purpose have been furnished by a philanthropist too

modest to give his name, but the aid is none the less substantial because of this. When the Agassiz Association was first started, there were practically no books of a popular nature by which a student, working alone, could get an insight into the phase of natural history that attracted him, but with the increase of science-teaching in the schools and the issuing of a vast number of books on every conceivable phase of nature, the need for a society like the Agassiz Association was less urgent and there was a general falling off in membership. We are of the opinion, however, that there is as still, a decided need for something of the kind and that Dr. Bigelow will find out how to adapt the society to the need. If "Arcadia" proves to be a success after two years trial, it will become a permanent feature; if not, we may expect Dr. Bigelow to originate something else as novel. More than twenty thousand boys and girls have been helped over hard places by the Agassiz Association. Among them was the editor of this magazine who remembers with pleasure and gratitude his connection with it and he could wish no better fortune for the rising generation than that it, too, may discover the delights of membership. The American Fern Society, the Sullivant Moss Chapter, and the Gray Memorial Botanical Chapter, all had their origin in the old Agassiz Association.

* * *

The appearance of an edition of "Gray's Manual" containing pictures of a large number of plants has called forth a protest from Henry M. Bolley who takes the ground in a recent number of *Science* that the usefulness of the manual is greatly impaired for school work because it no longer compels the student to study out all the details of the plant in hand to be sure of not going astray. In a large number of cases he now has only to look at the pictures and compare his plants with them. While the latter proceeding may put the pupil in possession of

the name more quickly, Prof. Bolley contends, with reason, that it will deprive him of much valuable botanical training. The tendency of school children, and even of adults, to make the name the end and aim of botany needs to be curbed rather than fostered. In the manuals we have greater need for accurate keys so worded that the terms, themselves, shall not lead the pupil astray, than we have for pictures of plants. It may even be suggested that common names be omitted as their presence is a constant temptation to the student to rely upon the index instead of upon his own abilities.

* * *

The statement by the publishers of Wood's "Class-book" that this most valuable manual has just gone out of print, will affect a large number of botanists like the death of an old friend. For more than sixty years the book has held an honored place in the library of botanists. Time has shown some of its statements to be incorrect, the extension of our knowledge has added many new species to our flora, the battles of the nomenclaturists have changed many of the old familiar names and yet the book has held its own through the sheer genius of its author for knowing and vividly describing plants. Alphonso Wood was not a closet naturalist. He knew his plants in the field and many of his descriptions read as if made with the living, growing plant before him. His keys siezed upon the most salient features for distinguishing species, whether along strictly scientific lines or not. After the more technical matter relating to a plant it was his custom to add more or less information of a more popular character—what the plant was good for, how and where it grew, its height, etc. In our species-naming days when the technical descriptions in Gray left us in some doubt as to the exact identity of a given plant, we turned to these more popular descriptions and made sure. We have never ceased to recommend the book to those studying botany alone and would rejoice to see a re-issue

of it brought up to date by someone with the same love for the plants and a similar attitude toward nomenclature and species-making. In these days of the strenuous, ultra-scientific manual there would seem to be room for just such a book. To do the work properly it would need a man like Dr. Bessey or Dr. Beal. Meanwhile we who have copies of the old book may continue to botanize with pleasure while others may dig their species out of Britton's or Gray's—if they can!

BOOKS AND WRITERS.

With the beginning of its twentieth volume the British *Nature Notes* which is the organ of the Selborne Society resumed an earlier title and is now to be known as *The Selborne Magazine*. The Society takes its name from the locality made famous by the naturalist-parson Gilbert White and is doing a good work in preserving the fauna, flora, foot-paths, ancient monuments, and picturesque regions from destruction as well as advancing the study of natural history and the love of outdoors. There is no American society exactly like it, but this does not imply that there ought not to be.

Not the least valuable feature of the Bergen text-books is the fact that they are not allowed to get out of date. A revision of the "Essentials of Botany" has just been made and this book, which stands midway between the author's "Elements of Botany" and "Principles of Botany" now offers a very good text for the average year's course in plant study. The only objectionable feature that we note, is the inclusion of directions for laboratory work with the text, but this would not be an objection in schools where laboratory guides are not in use. The book gives a necessary survey of the lower groups of plant life, but omits many exceptions that only serve to puzzle the high school student, all of which is to be commended.

The Amateur Naturalist, profiting by a good example, has become a quarterly commencing with the January number which begins volume VI. The magazine now contains 24 pages an issue and costs 50 cents a year. In our opinion it is worth the price to anybody interested in the natural sciences.

Books devoted to "biology" which consist of elementary accounts of botany, zoology and human physiology bound in one volume continue to appear doubtless in response to that phase of teaching which holds that such a mixture is better than separate courses in the sciences mentioned. Among such books the "First Course in Biology" by L. H. Bailey and W. M. Coleman is likely to take a prominent place. It may be doubted whether any course in biology covering but a single year will ever prove satisfactory, but if it should, the present book is likely to be a very desirable one for the purpose. The treatment of both the botany and zoology follows the accepted order, beginning in the former with the seed and in the latter with simple-celled animals. The botanical part, however, follows rather too closely the older books by Gray which have quite passed out of use as text-books for schools except in a few remote localities. In our opinion there is too much emphasis laid upon definitions. Much time is given to the forms of leaves, flowers and other parts that might more profitably be given to studies of structure and function. Provision is made, however, to extend the botany for a second half year by the use of additional matter set in small type. The zoological end of the book also admits of use for a year instead of a healf year by taking up various matters in fine print. This part of the book shows no special advance over others of its kind but seems likely to give the beginner a fair idea of the diversity and relationships of animal forms. The book is well illustrated, containing more than 800 figures. It is published by the MacMillan Company, New York at $1.25 *net.*

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CONTENTS

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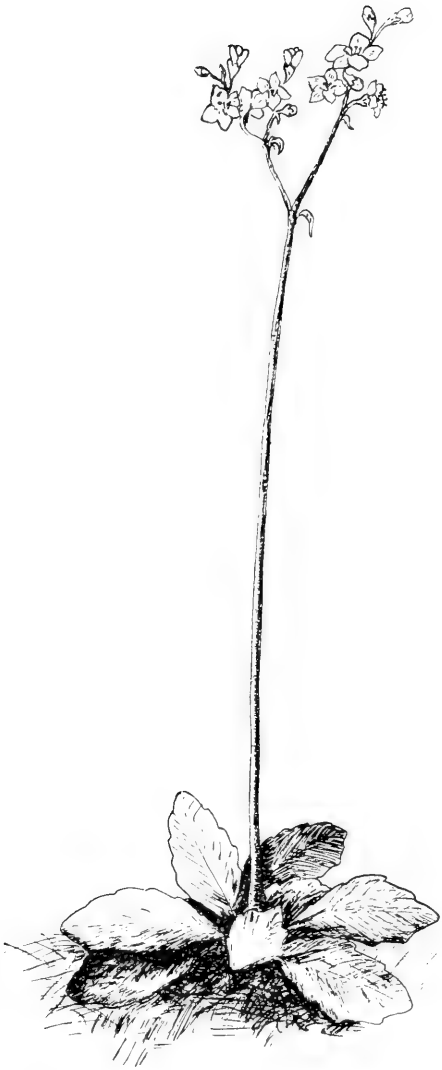


CALIFORNIA SAXIFRAGE.—*Saxifraga Californica.*

THE AMERICAN BOTANIST

VOL. XV JOLIET, ILL., MAY, 1909 No. 2

"No plot so narrow, be but nature there,
No waste so vacant, but may well employ
Each faculty of sense, and keep the heart
Awake to love and beauty."

THE STORY OF THE SAXIFRAGES.

BY WALTER ALBION SQUIRES.

THE little saxifrage (*Saxifraga Californica*) is one of our early spring blossoms. In this part of California its delicate white or pink-tinted flowers appear early in February. Its slender, red scapes delicate scarlet-tipped sepals, and tiny pink stamens give to it a beauty and grace which are quite its own. It is usually found only on cool, shady northern slopes, making its home among the mosses and maidenhair ferns. Indeed, it seems rather shy and modest as though it were not quite at home in the "land of sunshine and roses."

Our coldest season is its season of growth. When chilly winds from the Pacific sweep through the Golden Gate and the frost is on the hills of the North Peninsula it pushes up its slender scapes in the mossy glens of cold canyons. By the first of February it is in blossom. Before spring is fairly begun it is ready to mature its seeds, and then it creeps back under its coverlet of mosses to sleep through the long summer until the rains of another winter. Little wanderer from that interesting family of plants which encompass the pole in the northern hemisphere, it is not like many of our California flowers which fling back the flood light of summer days with gold as bright as the sunbeams. It is still a lover of the cold.

The home of the saxifrages is the far north,—the dreary, wind-swept "barren grounds" of the Arctic tundra. On the product maps of our school geographies there used to be a dotted line marked "northern limit of trees." The vast region north of this line stretching from Cape Prince of Wales, to Labrador was labeled "Mosses and saxifrages." This great expanse in the bleak dwelling place of the genus *Saxifraga.*

Many of the species of these Arctic regions extend their range far to the southward along the great mountain systems of the northern hemisphere. Those farthest south are found as isolated colonies on lofty mountain peaks. *Saxifraga oppositifolia* has been found on the Green Mountains of Vermont and along the crest of the Tetons in the West. It makes its home on the heights of the Pyrenees, among the Alpine peaks, and on the Jura Mountains. Botanists have found it on Ingleborough Hill in Yorkshire and on Snowdon in Wales. These are its southern outposts; northward it is found in increasing abundance to the shores of the Arctic Sea.

S. tricuspidata is found in both Europe and America. In the eastern part of North America it comes as far south as Lake Superior. In the West it lives among the *Bryanthus* and Arctic willows on the lofty volcanic crater of Mt. Hood. *S. stellaris* grows along the margin of the Greenland ice-sheet and on the cold Labador uplands. Its most southerly stations are on Mt. Katahdin in Maine and on Mt. Evans in Colorado. A few species are confined to the United States and two or three are found as far south as North Carolina or Georgia. The habits of these southern species show their northern origin. They cling to the margins of cold mountain brooks or the edges of bogs.

To account for the wide spread dissemination of northern species of plants and for their occurrence in isolated colonies on the mountains of the northern hemisphere is one of the fascinating problems in the realm of plant life. It would

seem that such cold-loving plants as the saxifrages first appeared near the poles when the world's first winter began. In that winter of winters, the glacial period, the continental ice-sheets advancing southward drove the Arctic flora before them. After other ages the ice began to melt from about the Great Lakes, on the prairies of the Mississippi Valley, and on the Cordillera of the West. Step by step the glaciers withdrew toward their northern home leaving behind them long lines of moraine and glacial drift. Before the advancing summer the Arctic plants retreated northward following close after the glaciers. But not all returned, some found abiding places in peat bogs and on cool northern hill sides. Some were cut off and ascended mountain slopes, pushed higher and higher by the advancing age of summer until they found their present homes on lofty mountain peaks near the eternal snow.

San Anselmo, Calif.

EXPERIMENTS WITH SEEDS AND SEEDLINGS.

By Willard N. Clute.

POSSIBLY because the subject of botany usually begins with seeds, or possibly because seeds lend themselves readily to such a variety of experiments, we often find a disproportionate amount of time given to seeds in botanical courses. It is certainly true that after studying the structure of typical seeds we should proceed to see what uses the parts have and how ordinary conditions of heat, light, moisture and air act upon them, but in doing so it is well to discriminate sharply between those experiments which elucidate general physiological principles and others which are concerned merely with special structures and functions. In this latter category may be placed the study of the "peg" of squash and other cucurbit seeds. In an exhaustive study of seeds the special way in which the embryo of the squash gets free of the testa may be studied and also the behavior of the cotyledons in the cocoanut

and date during germination but in the ordinary high-school course these may be disregarded since they are special cases and have no place in the functions of the great majority of seeds.

That seeds need moisture to grow is a fact familiar to every high-school student; as to how much they need and how they obtain it, the conception is not so clear. We may discover how much water a given seed will absorb by weighing a quantity of the seeds, placing them in water for a day, and after wiping the moisture from the outside weighing again. Seeds will usually take up more than their weight of water. To decide where water enters the seed we may place some dry seeds in colored water and note the path colored. The seed of the white lupine, sold by most seedsmen is excellent for this purpose though any large seed will do. In the absence of the lupine, the common white or navy bean may be used but care should be taken to see that the testa is intact. In many seeds the testa swells up in ridges along the path of the water and will show its course without the use of coloring matter. If it is desired to discover whether the micropyle and hilum are of any special advantage in absorbing water the behavior of a set of seeds in which these parts have been covered up with wax or rubber cement may be compared with that of a set which have not been treated thus. Or one set of seeds may be partly immersed in moist sand with their micropyles exposed, while the other has the micropyles buried in it. It can be shown easily that ordinary dry seeds contain water by putting some seeds in a test tube and heating over a flame, first plugging the mouth of the tube with a tuft of cotton. Moisture will then condense on the cooler part of the tube. Notwithstanding this, seeds once started to germinating will die if dried and this may be proven by experiment.

In many studies of seeds it is usual to prove that the stored food is necessary to the young seedlings by cutting off one or

both cotyledons, removing the endosperm, etc., and comparing the growth of such mutilated plants with normal ones. These experiments, however, need to run for several days and are not calculated to hold the interest of high school pupils. With such students it may be taken for granted that they understand that the stored starch, oil and proteid serve the seed exactly as they would an animal.

The pupil will readily understand that some of the food is used by the seedling in forming new parts, but the idea that the food is a source of energy for the plant is more obscure since at first glance the seedling does not seem to use energy. The force used in pushing through the soil should be conclusive on this point. It is often assumed that the bursting of the testa is an illustration of the use of energy, and this force is usually shown by the time-honored experiment of filling a botttle with germinating seeds which in swelling will burst the bottle. This experiment, however, is probably more physical than physiological. A bottle full of small cubes of dry wood might be expected to give the same result. A more appreciable idea of the force exerted by growing plants may be had by placing a pane of glass over a pot of thrifty young seedlings. By placing varying weights on the glass it will be easy to see just how much force a given number of seedlings can exert. Heat is another form of energy liberated by plants, but in such small quantities that it is difficult to detect. By taking two thermometers that read alike and plunging one in a jar of germinating seeds while the other is placed in a similar jar of dry seeds it is possible to detect the heat given off but it frequently happens that the presence of bacteria in the germinating seeds gives a temperature that while pleasing to the experimentor is much too high to be accurate.

Some of the experiments with seeds that are often performed in the high-school course but which do not seem to be essential are those designated to discover where the caulicle

ends and the root begins, how the embryo breaks out of the ground, how the seed-coats are burst in different seeds, the effect of depth upon germination, the amount of pressure exerted by the root in pushing downward, etc.

The subject of digestion in seedlings is one often avoided in a course of this kind but it is easy to show that starch will not diffuse through a membrane and then by adding diastase to the starch to show that diffusion takes place. Starch may also be digested by making an extract of starchy seeds and adding dilute sulphuric acid. Test in the usual way for sugar.

PROSERPINA: STUDIES OF WAYSIDE FLOWERS.

By Rev. John Davis.

"IT is mortifying enough to write—but I think this much ought to be written—concerning myself, as the author of Modern Painters. In three months I shall be fifty years old; and I don't at this hour (ten o'clock in the morning of the two hundred and sixty-eighth day of my forty-ninth year) know what 'moss' is." There is nothing I have more intended to know,—some day or other. But the moss 'would always be there;' and then it was so beautiful, and so difficult to examine, that one could only do it in some quite separated time of happy leisure,—which came not. I am never likely to have less leisure than now, but I *will* know what moss is, if possible, forthwith.

Thus begins the prose-poet, Ruskin the charming book which bears the caption of this article. The "Sage of Brantwood" made good his promise. Proserpine was the result. And where could one turn for a more delightful account of the formation, growth and purpose of this lowliest of nature's gifts than in the opening chapter of the volume? Though the author soon passes from moss to flowers; the latter compris-

ing by far the substance of his treatise. The title-page gives the clue to the book.

> "Oh Proserpine!
> For the flowers now, which frighted, thou let's fall
> From Dis's waggon."

Proserpine was the daughter of Zeus and the earth-goddess Demeter. As she was gathering flowers with her playmates in a meadow, the earth opened, and Pluto, god of the dead, appeared and carried her off to become his queen in the nether world. The pomegranate was her symbol, and flower festivals were held every spring in her honor. Thus her name was fitting to symbolize an anthology.

Ruskin gives us here an unconventional monograph on the more common (and therefore less studied) flora of field and hedgerow; as the violet, butterwort, foxglove, thistle, dandelion. He descants eloquently on the root, stem, leaf, flower, bark and even genealogy of Proserpina,—fascinating the reader with the life-history of these trite flowers. Not that we are to expect a systematic or even satisfactory text-book of Botany, since there is quite enough in the book to challenge opposition. But it is throughout stimulating. For Ruskin is more than botanist, or artist, or even critic. He is above all a moralist; now drawing some profound life-lessons from the habits of the humblest plants of the meadows; now leading us delightfully among the classic fields of Thessaly and Arcady, with the companionship of Diomed and Athena, with Daphne and Apollo.

Our author pays his respects in no uncertain terms to those botanists who offend with their ever-changing nomenclature. On this point the "conservatives" have a strong ally. Speaking of the genealogy of flowers, he writes:—"I call the present system of nomenclature *confusedly* edifying, because it introduces, without apparently any consciousness of the inconsistency, and certainly with no apology for it, names founded

sometimes on the history of plants, sometimes on their qualities, sometimes on their products, and sometimes on their poetical associations." He insists that we should always make our text-books intelligent (and therefore attractive) to our children; keeping clear in mind, "whether we wish our nomenclature to tell us something about the plant itself, or only to tell us the place it held in relation to other plants. Before we can wisely decide this point we must resolve whether our botany is intended to be useful mainly to the vulgar, or satisfactory to the scientific elite. My own method, so far as hitherto developed, consists essentially in fastening the thoughts of the pupil on the special characters of the plant in the place where he is likely to see it; and therefore in expressing the power of its race and order in the wider world; rather by reference to mythological association than to botanical structure. So far as I have influence with the young myself, I would pray them to be assured that it is better to know the habits of one plant than to know the names of a thousand; and wiser to be happily familiar with those that grow in the nearest field, than ardously cognizant of all that plume the Isles of the Pacific, or illumine the Mountains of the Moon."

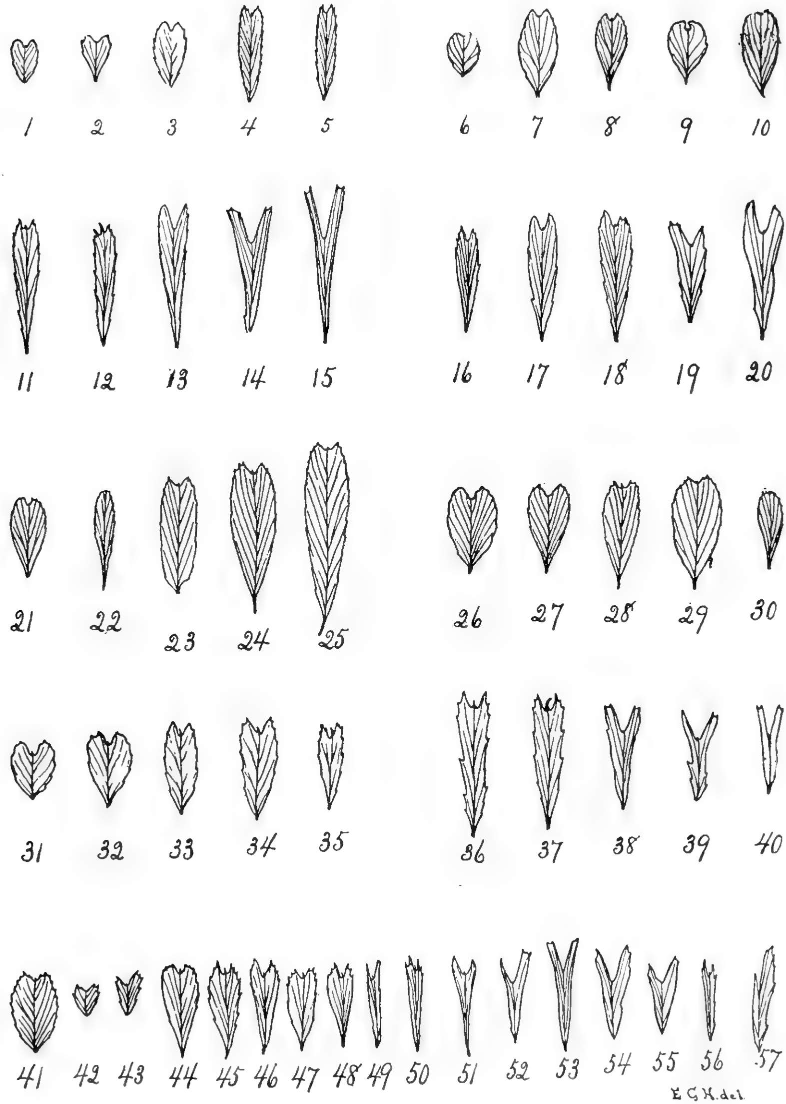
Passages as delicious in their humor as they are incisive in their invective (but in either case luminous and stimulating), we might multiply without stint. Note this charming metaphor of Daphne, "the ruling power of the leafy peace," in the chapter on the Leaf. "She is, in her first life, the daughter of the mountain river, the mist of it filling the valley. The sun pursuing and affacing the mist from dell to dell, is literally Apollo pursuing Daphne. Thus hunted, she cries unto her mother, the Earth, which opens and receives her, causing the laurel to spring up in her stead. That is to say, wherever the rocks protect the mist from the sunbeam, and suffer it to water the earth, there the laurel and other richest vegetation fill the hollows, giving a better glory to the sun itself. For sunshine

on the torrent spray, on the grass of the valley, and entangled among the laurel stems, or glancing from their leaves, become a thousandfold lovelier and more sacred than the sunbeams, burning on the mountain side."

What an eloquent burst on the mysterious Law governing the Immutability of Species:—"But through all defeats by which insolvent endeavors to sum the order of Creation must be reproved, and the midst of the successes by which patient insight will be surprised, the fact of the *confirmation* of species in plants and animals must always remain a miraculous one. What outstretched sign of constant Omnipotence can be more awful, that the susceptibility to external influences, with the reciprocal power of transformation, in the organs of the plant; and the infinite powers of moral training and mental conception over the nativity of animals, should be so restrained, within impassible limits, and by inconceivable laws, that from generation to generation, under all the clouds and revolutions of Heaven with its stars, and among all the calamities and convulsions of the Earth with her passions, the number and the names of her kindred may still be counted for her in unfailing truth;—still the fifth sweet leaf unfold for the Rose, and the sixth spring for the Lily; an yet the wolf rave tameless round the folds of the pastoral mountains, and yet the tiger flame through the forests of the night."

Ruskin has been placed, after Shakespeare, as the greatest force in English Literature. It is not extravagant praise. As a stylist in English prose he has no superior, past or present. A study of the varied and copious volumes that flowed from his pen during a half century of unwearied toil, would of itself end in a liberal culture. These lines are offered rather as suggestions; to commend the readers of THE AMERICAN BOTANIST to the pages of Proserpina, and incidentally to the entire writings of the versatile author.

Hanibal, Mo.



VARIATION IN TRIFOLIUM BIFIDUM.

VARIATION IN PLANTS.

UNTIL DeVries issued his monumental work on the mutation theory, it is probable that most botanists did not realize the great amount of variability there is in plants, though the fundamental principal of the Darwinian theory is concerned with this fact. We present herewith an excellent illustration of the variations that may exist within a single species which is republished from *Muhlenbergia* for February 1909. The species illustrated, *Trifolium bifidum,* is not uncommon west of the Rocky Mountains from British Columbia to Mexico. Various forms have been named *Trifolium decipiens, T. Hallii* and *T. Greenei* but a careful examination of a large range of material by Messrs. Heller and Kennedy have convinced them that these so-called species have been based on trivial characters. As may be seen, little dependence can be placed on the shape of the leaf and the authors suggest that variations in the food supply may account for the forms.

THE RELATIONSHIPS OF PLANTS.

NOT so very long ago most scientists divided the plant kingdom into four groups, the highest of which included the flowering plants and cone-bearing trees. The next contained the ferns and their allies, the third consisted of mosses and liverworts and the lowest all that multitude of simple forms which we call fungi, algae, lichens, sea-weeds mildews, yeasts, etc. But for some time this arrangement has not suited the botanists for in many cases the distinctions that separated lesser groups in these great groups were nearly as great as those that separated the great groups themselves. To remedy this, various re-arrangements have been suggested, two of which will be presented here for comparison.

In "*University Studies* for October 1907, Prof. C. E. Bes-

sey proposes to divide the plants into fifteen great groups or phyla as follows:

MYXOPHYCEAE. Blue-green algae. Bacteria, etc.
PROTOPHYCEAE. The simple green algae.
ZYGOPHYCEAE. The conjugate algae.
SIPHONOPHYCEAE. The coenocytic algae and fungi.
PHAEOPHYCEAE. The brown algae.
CARPOPHYCEAE. The red algae and chara.
CARPOMYCETEAE. The higher fungi.
BRYOPHYTA. Mosses and liverworts.
PTERIDOPHYTA. The Ferns and quillworts.
CALAMOPHYTA. The Horsetails.
LEPIDOPHYTA. Lycopodium and Selaginella.
CYCADOPHYTA. The joint firs.
GNETALES. The conifers.
STROBILOPHYTA. The Conifers.
ANTHOPHYTA. The flowering plants.

Contrasted with this is the arrangement proposed by Prof. J. H. Schaffaer in *Ohio Naturalist* for April 1909. His arrangement adds one more phylum and re-distributes various problematical small groups, but in general the lists agree very well. The list follows:

SCHIZOPHYTA. Fission plants, 2,400 species.
MYXOPHYTA. Slime moulds, 400 species.
DIATOMEAE. Diatoms, 3,000 species.
CONJUGATAE. Conjugate Algae, 1,200 species.
GONIDIOPHYTA. Most green algae, 2,000 species.
PHAEOPHYTA. Brown algae, 1,000 species.
RHODOPHYTA. Red algae, 2,000 species.
CHAREAE. Stoneworts, 160 species.
MYCOPHYTA. Fungi, 47,000 species.
BRYOPHTA. Mosses, etc., 17,000 species.
PTENOPHYTA. Ferns, 4,500 species.
CALAMOPHTA. Scouring Rushes, 25 species.

LEPIDOPHYTA. Club mosses, 660 species.
CYCADOPHYTA. Sago palms, 90 species.
STROBILOPHYTA. Conifers, etc., 400 species.
ANTHOPHYTA. Flowering Plants, 125,000 species.

Although botanists may not agree as regards the indications of genetic relationships, there is more unanimity in respect to what are not to be considered indications of such relationships. Among these Prof. Schaffner enumerates origin of sexuality, differentiation of gametes, passage from a unicellular to a filamentous condition differentiation of filament into base and apex, loss of chlorophyll with development of parasitism and saprophytism, development of unisexual gametophytes, loss of sexuality, origin of heterospory. development of complex forms, development of woody stems, development of the annual habit, development of epigyny, development of cyclic flowers, coalescence of perianth or other organs, decrease in the number of floral parts, development of zygomorphy, increase or decrease in the number of ovules, the presence of opposite or alternate leaves, development of geophily, development of various kinds of fruits, extra floral nectaries, etc. —*W. N. C.*

THE FRUIT OF THE LEGUMINOSAE.

BY WILLARD N. CLUTE.

THAT "the fruit of the Leguminosae is a pod" is an axiom well conned by students of systematic botany, but the definition of a pod is a matter of some difficulty. Any extended study of the fruit of this great family of plants is likely to disclose such a great variety of pods that the longer one studies the more difficult does he find it to make a definition that will fit them all. While still in the flower, he can say with some certainty that the pistil is monocarpellary, that is, it consists of a

single carpel with one parietal placenta, but as it goes on toward maturity it begins to put on its disguises. In our most familiar examples, such as are supplied by the bean and pea, it opens as two flat valves. Often the opening is a mere matter of falling apart, but in some of the *Cassias* the pod is often under considerable tension through drying and when it does open, it does so with a snap that sends the seeds in all directions. On the other hand, many pods like those of the peanut never open while still others open only along one side and therefore conform to the definition of a follicle. We usually assume that the pod is one-celled, but in many of those that do not open there are cross-partitions between the seeds, making a several-celled pod. Proceeding on this line, several species, like the tick-trefoils, have worked out a system of seed distribution by the pod breaking into pieces and thus while the pod cannot truly be said to open, its behavior results exactly as if it did. In some of these indehiscent pods, the seeds are surrounded by a juicy pulp as in the tamarind, while in other styles the seeds are found in inflated bladdery pods, as in *Colutea*. Normally the pods are long and straight but in several species of the genus *Medicago*, to which the alfalfa belongs, the pods are coiled spirally like a snail-shell. The normal pod, as has been said is one-celled, but in addition to species in which there are cross-partitions, there are others in which a projection from the walls of the pod nearly divide it into two longitudinal sections as in the well-known cress family. In still other plants the pod bears but a single seed and does not open, thus forming a fruit that in other groups would be called an achene, while in *Plcrocarpus,* the single seed is winged all around and is thus a samara. In a few species the seeds are covered with a fleshy material forming what is essentially a drupe.

FIELD BOTANY

Edited by Dr. H. A. Gleason, Urbana, Ill.

Farther east, flowering dogwood is more common and does not excite so much interest, but here in Illinois it is rare and is found along only a few of the streams. One of these is the Vermillion river, which empties into the Wabash in Indiana near the Illinois state line. Ascending the river toward the west, the dogwood becomes steadily less abundent, and finally disappears completely about ten miles from Urbana. It is very conspicuous during the blooming season in May, and the nature lover, strolling along the river, can follow its distribution without difficulty. There is one hillside far down the stream which at this season is fairly white with dogwood bloom, and which harbors so many other interesting plants as well, that it becomes a paradise for the botanist. The hill is steep, probably eighty feet high and covered from top to bottom with dogwood. In the rich leaf mold beneath the trees are thousands of shooting-stars, which bloom at the same time. In drier, sunny places, the ground is covered with hoary puccoon (*Lithospermum canescens*), star-grass (*Hypoxis hirsuta*), lousewort (*Pediculairis canadensis*) and columbine. Some of these plants are common out on the prairies, but are quite unusual growing together in the woods.

Government Tree Study.—The Forestry Service of the United States is making an effort to secure more definite information regarding the time of leafing, flowering and fruiting of our common trees and invites the teachers of botany and nature-study throughout the country to contribute notes on the subject. It is intended to publish the results in a series of colored charts that will be of great value in extending our

knowledge of, and interest in, the trees. Upon application to the Forestry Service, forms upon which the notes are to be recorded will be sent, together with a pamphlet containing full instructions for making the observations wanted. Those who are alive to the value of a more intimate knowledge of the trees should not neglect this opportunity to aid in the investigations. Notes will be welcome from anyone interested in the subject.

Colorless Plants.—So universally distributed is plant green, or chlorophyll, that when we chance upon a plant which lacks this color it is always an object of wonder. To those who have studied the physiology of plants the wonder is increased for it is a well-known fact that the plant food is made in the leaves and stems of plants and that the energy for making this food is derived from the sunlight by the chlorophyll. Without chlorophyll, therefore, the plant can make no food for itself. There remains but one method of existence open to such plants, namely, to depend upon some other plant or animal for sustenance. The dodder solves the problem by boldly attaching itself to some green plant and by means of special sucking organs, called haustoria, taking from it the needed food. Other plants have formed partnerships with bacteria and fungi, in which the latter obtain for them the food they cannot make for themselves. Curiously enough many of the plants which long ago gave up an independent existence still bear indications about them of a higher state, for the leaves, though no longer functional are found to have retained the stomata, or openings, which in higher plants, admit the air to the interior of the leaf in the process of food-making.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their shorter botanical items. The magazine is issued as soon as possible after the 15th of February, May, August and November.

YELLOW VARIETIES OF RED BERRIES.—Apropos of your note in the February issue, anent yellow berried holly, it is interesting to note that the plant which is known on the Pacific Coast as California holly, and which normally bears red berries, occurs occasionally on Santa Catalina Island with yellow berries. Botanically the plant is *Heteromeles arbutifolia,* an evergreen shrub or small tree of the rose family and its use in Christmas decoration is quite extensive on the Pacific Coast, where the true holly is not indigenous, I believe.—*C. F. Saunders, Pasadena, Calif.*

THE BITTER ROOT.—In the 5th volume of *Muhlenbergia* the editor, A. A. Heller, has begun a series of popular articles on various plants of the West that thus far have been but mere names to most eastern readers. In the January number a picture of the bitter root (*Lewisia rediviva*) is given together with an account of its discovery, appearance and uses. The plant was named by Pursh for Captain Meriwether Lewis, "the pathfinder," who discovered it in Montana upon his return journey from the Pacific Coast in 1806. The plant has since become well known and has been adopted as the State flower of Montana. Long before Montana was even a territory, however, the plant was well-known to the Indians who found

the thick roots both palatable and nourishing and used them in soups. A single ounce of the dried root is said to be sufficient for a meal. The bitter root is own cousin to the "pusley" and portulacca of our fields and flower gardens and has the same fleshy leaves but these commonly die before the rosy flowers appear.

THE TRUE SHAMROCK.—"Irish botanists of note, including Keough, Theilkeild and others assert that all history, romance, sentiment and common sense unite in designating *Trifolium repens* as the true Irish shamrock. The weight of evidence is in its favor and the studied effort of late years to make it *Trifolium minus* seems to have very little ground to stand on. If one imports a piece of Irish sod with clover on it one has a right to sell it for pieces of eight; but outside of that, anyone with *Trifolium repens* can say with a clear conscience that he has the real Irish shamrock."—*Horticulture.* [The *Trifolium repens,* here mentioned is, of course, our common white clover of lawn and door yards.—ED.]

WEEDS KILLED BY CHEMICALS.—Between the weeds and the bugs, the farmer's life in the growing season is made a strenuous one. The bugs however, have been pretty well overcome by the use of various poisons and the question now is, can weeds be eradicated by similar means. While weeds do not eat up the crops, as the bugs do, they are quite as serious a menance to our food-plants. They rob the growing plants of light and heat, they take from the soil a great quantity of the soil water, they prevent light rains from reaching the soil at all and when the crops are harvested the presence of weed seeds lessens the price at which they can be sold. In recent years many experiments have been made in spraying crops with various chemicals designated to kill the weeds and leave the crops unharmed. One of the most valuable of these chemicals is sulphate of iron. When sprayed on fields of grow-

ing grain it invariably kills out the weeds without harming the other plants. At first glance this seems a preposterous statement since it is naturally assumed that what will kill weeds ought to kill other plants. The explanation, however, is this: The leaves of our grains are covered with a fine coating of wax, called bloom, which sheds the chemical when sprayed upon it, while the leaves of most weeds, lacking such protection, are burned up in consequence. The sulphate of iron is likely to have no effect on weeds whose leaves are protected by bloom and will kill field crops lacking the protection.

FLOWER PIGMENTS.—It begins to look as if the great range in the color of flowers, which renders them so attractive to us, is merely a matter of a few chemicals. C. M. Broomall has been experimenting along these lines and in the "Proceedings of the Delaware County Institute of Science" for January, notes that in general an alcoholic solution of the petals of red and pink flowers will turn green when alkali is added and red if acid is used; yellow, purple and blue flowers turn green with alkali but resume their original colors when acid is applied. The experimentor finds sodium hydroxide and nitric acid to be satisfactory reagents, though other acids and alkalis may be used. Care should be taken not to add an excess of the reagent. If this is observed, the solution of a given flower may be turned to green and back again a number of times by making the solution alternately acid and alkaline. It is concluded from these experiments that the flowers have but three pigments, red, yellow and blue, from which by various combinations all the other colors can be made. In nature, the evolution of carbon-dioxide in the flower is supposed to give the necessary acid for slowly changing the color of the greenish buds to that of the mature flower. The pigment appears to be present in the flower-buds even while yet green, for if they are placed in weak acid solutions at this

time they will assume the hues of the fully expanded flower. There is much still to be investigated in this subject. We would like to have some explanation from this theory on the causes of the color changes in flowers—those that open red and change to blue or those that open yellow and change to red, for instance. The flowers that open white and turn to pink, as in the case of *Trillium gradiflorum,* can be explained upon the supposition that the red pigment is here late in developing. The pigments in many flowers seem very stable, since specimens that have been pressed and dried for more than half a century gave nearly as good results as fresh flowers.

FLOWERS OF THE TROPICAL FOREST.—Some of the forest trees of Uganda offer magnificent displays of flowers. There is one, the Spathodea with crimson-scarlet flowers larger than a breakfast cup and not very dissimilar in shape. These flowers grow in bunches like large bouquets and when in full blossom one of these trees aflame with red light is a magnificent spectacle. The *Lonchocarpus* trees have flowers in color and shape like the wistaria; from the branches of the lofty eriodendrons depend on thread-like stalks, huge dull crimson flowers composed of innumerable stamens surrounded by thick carmine petals. The *Erythrinea* trees on the edge of the forest seldom bear leaves and flowers at the same time. When in a leafless state they break out into a crimson-scarlet efflorescence of dazzling beauty. The *Pterocarpus* trees have large flowers of sulphur-yellow.—*National Geographic Magazine.*

LIVING AND DEAD MATTER.—We are accustomed to think of the cell as the smallest part of a living plant and a structure quite distinct from ordinary inorganic matter but a writer in *Science* takes a different view of the subject. He says "The only essential characteristic and constant difference between living and non-living matter is that within the former there is constant and rythmic metabolism, while in the latter

no such process occurs. The living cell is made up of active labile molecules and these molecules consist of numerous atoms and each atom contains a large group of electrons; atoms and electrons are in ceaseless rythmic motion while groups of atoms are being constantly cast out of the molecule and replaced by new groups, split off from matter outside the molecule. Matter is endowed with life when it becomes the seat of that form of energy which makes of it a metabolic mechanism. As soon as a molecule becomes the seat of assimilation and excretion, it is no longer dead; it lives."

A California Poppy Note.—While the California poppy can hardly yet be classed in the list of disappearing wild flowers, it is a fact that it is much scarcer near the larger cities of the Southern California tourist belt than it was even a few years ago. This is due partly to the gradual settling up of the land and the bringing of it under the plough; but quite as much, perhaps, to the wasteful gathering of the blossoms by crowds of wildflower hunters, who often carelessly pluck the plants up by the roots. Fortunately it grows readily from seed broadcast, and it is interesting to note that along the line of the electric railway between Los Angeles and Pasadena, the company keeps a long strip of its roadway annually sown to this golden wild flower, which at the height of its blooming is always the source of especial delight to the nature loving traveler.—*C. F. Saunders, Pasedena.*

Peat Bogs.—The resident of the northern parts of our country may be inclined to think he knows what a peat bog is, and he may be surprised to learn that the well-known boggy stretch covered with sphagnum and inhabited by pitcher-plants, sundews and similar vegetation is but one type of peat bog. This is the flat bog, but there are also hanging bogs and raised bogs. The hanging bog is found on mountain sides where a copious supply of water seeping down allows the peat

vegetation to grow. The raised bog is apparently rare in this country but common in Ireland and other parts of northern Europe. In this type the sphagnum moss raises the water by capillarity until the centre of the bog is sometimes more than twelve feet above the water level in the basin where the bog is forming. Heavy rains may cause the bogs to burst devastating the adjacent country. In 1896, according to a writer in *Plant World,* a bog in County Kerry, Ireland, burst discharging nearly six million cubic feet of peaty matter and drowning several persons. The low temperature of sphagnum bogs is said to be due to the persistence of the winter's cold and ice which the blanket of sphagnum helps to retain.

THE NUT PINE.—One cannot always imagine the vegetation of other parts of the world though familiar with related species of his own region. The seeds of our eastern pines are altogether too small to be eaten, but in parts of the west there are pines whose seeds are not only edible but large enough to have some importance as an article of commerce. One of the best known of these nut pines—*Pinus monophylla*—is illustrated in the February *Muhlenbergia.* This is the species whose seeds not infrequently find their way to eastern markets now-a-days. The seeds are highly prized by the Indians and when they are ripe practically the whole tribe repair to the forests to gather them. When roasted the seeds have a very pleasant flavor that is appreciated by others as well as Indians. The most interesting peculiarity about the tree is the fact that it bears but one leaf in a "bundle." An examination of the nearest species of pine will show that the leaves do not appear as those of other plants do here and there on the plant, but that from two to five are borne in a bundle on very short dwarf branches. The present species was named *monophylla* because it has but a single leaf. A study of development has shown, however, that the plant should have two leaves, but that one of each pair usually fails to grow.

WOOD PRODUCTION.—A few years ago, people spoke of "our inexhaustible forests;" they do not do so nowadays. Our country is still sparsely settled in comparison with many European countries but with characteristic extravagance, we have wasted the forests more than many a larger nation would have done. At present we are removing annually twenty-three billion cubic feet of wood. According to the *National Geographic Magazine* we use 100,000,000 cords of fire-wood; 40,000,000,000 feet of lumber; 1,000,000,000 posts and poles; 118,000,000 ties; 1,500,000,000 staves; 133,000,000 sets of heading; 500,000,000 barrel hoops; 3,000,000 cords of pulp wood; 165,000,000 cubic feet of round mine timbers and 1,250,000 cords of wood for distillation. Other nations are managing their forests in such a way that the annual increase of growth balances the wood removed. Unless we quickly adopt the same policy we will soon be dependent upon these more provident people for what wood we use.

HAIRS OF DICKSONIA.—The boulder fern (*Dicksonia pilosiuscula*) is frequently called hairy dicksonia, fine-haired mountain fern and other names of similar import to indicate its vestiture of hairs; indeed, the specific name here used also refers to the fact that the fronds are hairy. Going further we find that these hairs, or rather one of their qualities, is responsible for several other common names of the plant for the etherial oil which they secrete gives it the fragrance which has caused it to be named hay-scented fern, sweet-grass fern, sweet fern and the like. Microscopic examination of the leaf surface shows that the frond bears two kinds of hairs, acicular and glandular. The acicular hairs are simply pointed, but the glandular ones are terminated by a bulb-like swelling from which the fragrant and volatile oil is exhaled. The glandular hairs are most abundant on plants grown in dry sunny places, following the rule for vegetation in general in this respect. According to C. E. Waters the oil distilled from this plant has a

rather disagreeable odor at close quarters, but diluted with ether and exposed to the air reminds one of the usual fragrance of the fern.—*Fern Bulletin.*

PERENNIAL DODDER.—It is generally assumed that all the species of dodder (*Cuscuta*) are annual plants and the New Gray's Manual makes this assertion, but experiments recently carried on by F. C. Stewart and G. T. French show that the clover dodder (*Cuscuta epithymum*) at least is able to live over the winter as far north as central New York, and thus is a perennial species. In the opinion of these gentlemen, the plant chiefly survives the winter in this way instead of by seeds. The clover dodder is a European species that infests clover and alfalfa fields. The perennial parts of the plant consist of bundles of thread-like stems from a quarter to half an inch long, coiled about the stems and branches of the alfalfa, close to the soil. That these threads are alive and capable of growth was shown by placing the infested alfalfa plants in a green-house when the dodder at once resumed growth. Other hosts upon which the dodder was found are flea-bane(*Erigeron annuus*) yellow trefoil (*Medicago luplina*) and dandelion.

A RARE VOLUME.—At a recent auction sale in Philadelphia, according to the *Philadelphia Record,* a copy of William Darlington's "Florula Cestrica," published in 1862 was sold for $17.00. This does not indicate that botany is looking up, however, for the advance in price is to be attributed solely to the age of the book. Yet there are a good many appreciative plant students in this country who would be glad to exchange seventeen dollars for such a volume. The friend who sent us the clipping about the sale of the book added in a note the fol- following:

"I have never seen the *Florula,* which was the forerunner of *Flora Cestrica.* The latter is, I think, one of the most interesting botanical works ever written, and its thoroughness

still it makes it a valuable adjunct to the library of every one interested in studying the flora of southeastern Pennsylvania, as you doubtless know, without my telling you. But the feature about it I have always liked, is the pleasant comment which the old Doctor bestows upon the various plants, as he describes them, giving to the work something of the quaintness and flavor of Izaak Waltons' 'Complete Angler.' "

We sometimes wonder, after the last new species has been made and something like an agreement as to plant names has been patched up, whether the time will not come again when our prominent botanists may be attracted to the plants, as the early botanists were, by their beauty, their perfumes and their uses, and give us other books that are not mere compilations of facts, but breathe something of the spirit of regard for the flowers themselves which should animate every botanist worthy of the name.

A MUTATING RUDBECKIA.—Since reading of Dr. Beal's collection of mutating *Rudbeckias* in the AMERICAN BOTANIST for December, 1907, I found an unusual *Rudbeckia hirta* in an old field. Each head had eight regular rays and at the base of each ray was attached a cluster of shorter and narrower rays. The abnormal rays were of different lengths, some more than half as long as the normal ones. A few of them were broad and deeply cleft. All the heads (three) on the plant had this peculiarity.—*Nell McMurray, New Washington, Penn.*

[The head of *Rudbeckia* which Miss McMurray describes illustrates the transformation of some of the tubular disk corollas into rays. Examination shows that it is usually the marginal flowers of the disk that have thus changed, but in some cases flowers two or three rows in from the margin have also developed the rays. Their cleft shape is probably reminiscent of the five-lobed structure of the normal tubular corolla. If all the disk flowers should change in this way the result would be a "double" head, and it is interesting to note that this has been done with *Rudbeckia laciniata,* producing the cultivated golden glow.]

EDITORIAL

In 1908, when this magazine changed from a monthly to a quarterly, we adjusted the differences in the subscription price by giving a subscription for a year and a half to all who had paid for one year in advance. This extension made a large number of subscriptions end with the May number in the middle of a volume instead of at the end, as formerly. Since there are a large number of subscribers who like to have their subscriptions end with the year and the volume, we take this occasion to point out that all subscriptions ending with the present number will be extended to the end of 1910 upon payment of a dollar. This extension is offered, however, only to those who pay in advance and we trust all will take advantage of it. Bills for all subscriptions due will be found facing the frontispiece in each copy. These are made out for one year in advance but the extension of the time suggested may be obtained by the proper payment.

* * *

For the first time in seven years the editor of this magazine will not visit the Eastern Chautauquas this year. Instead he will have charge of summer classes in botany for teachers at the University of Illinois. Other classes in systematic botany and ecology will be in charge of Dr. H. A. Gleason, well and favorably known to readers of this magazine. Work in the summer session begins June 21st, and runs for nine weeks. Teachers who contemplate brushing up their knowledge of botany will find Dr. Gleason's classes a most efficient means to that end and we venture to assert that the other work in botany will be no further behind the pace set than conditions make necessary.

* * *

During the summer of 1909 Dr. E. F. Bigelow will conduct a summer school for nature study at Sound Beach, Conn.

This is the third summer school of this kind that Dr. Bigelow has started in Connecticut and the experience gained in the earlier work should make this new venture a most helpful one. The school will run for four weeks beginning June 21st and the cost of tuition will be nominal. Situated on the shores of Long Island Sound, the school should afford a most delightful opportunity for getting acquainted with nature under a capable teacher.

* * *

Of all the catalogues that have reached this office during the spring, we have been most interested in those from the Biltmore Nursery, Biltmore, N. C., and Wagner Park Conservatories, Sidney, Ohio. The Wagner Pork people seem to be concerned not only in selling the plants but in helping the buyer to plant them properly and to make them grow. The Biltmore catalogue is also well arranged and is worth owning for the illustrations of unusual flowers which it contains. The time has gone by when a rose-bush or a lilac planted in the middle of the lawn would be considered a complete decorative planting. Landscape gardening has moved forward with great rapidity during the past few years and if you own a half-barrel painted green stuck on a post in the front yard and intended for holding growing flowers in summer, it is time you tore it down and set your lawn in order. Even your weeping mulberries planted in the middle of the lawn ought to go. It has taken the public a long time to discover that shrubbery and flowers should be set on the borders of the lawn and not scattered promiscuously about it, and only the observant have found it out yet, but if you would not be left behind you must play the game. Get some of the progressive catalogues, buy something besides geraniums and asters, and join the movement for a more beautiful country.

* * *

At a recent meeting of the Germantown Horticultural Society, the secretary, George Redles, exhibited a specimen

of the yellow cypripedium which was the result of twenty-five years' search. As a boy, Mr. Redles had seen the flowers in the vicinity of Germantown and when he later took up botanizing, he wanted a specimen of these flowers but they were gone. Then began the hunt just brought to a successful termination. All botanists and botanizers who see something in botany besides a chance to change the names of plants or to make new and doubtful species will appreciate and sympathize with the spirit that urged on Mr. Redles' hunt. If it were the mere plant he wanted, he could have obtained it for a quarter from ony one of half-a-dozen nursery men; if it were merely to see it growing wild, a hundred correspondents could have told him where to get an armful of it; but the finding of the plant for himself could only be accomplished by his own efforts. And now that the plant is found and properly labeled, the finder must have a certain regret that the quest is ended, for it is the pursuit rather than the capture that attracts. In one form or another we all have our elusive moccasin flowers. The mere species does not matter so long as we have some object to take us out of ourselves and into the free out-of-doors. In his search for the moccasin into what distant retreats was not the searcher carried! Along many a path that real moccasins have trod, through shady ravines, across breezy uplands, in the dim woods, threading the tangled swamps; the apparent object, the moccasin flower; the real object, though perhaps but dimly understood by the searcher, the delight that comes from association with wild nature.

* * *

From articles in various botanical journals we judge that it is still the fashion in some remote quarters to chronicle the finding of wildflowers new to some particular political division of our country. The individual interested in adding new specimens to "our State flora" is engaged it seems to us in a pursuit that has more of sentiment in it than of practical bo-

tany, and one that is very little removed from the collection of leaves from the tombs of famous men, ferns from the great wall of China, and flowers from Palestine. Political boundaries have little basis for existence except expediency and may as likely run across a natural physiographical area as be co-extensive with it. If these industrious individuals were only engaged in making a complete flora of a mountain chain or even a single peak, of a lake basin, a river valley, a geological outcrop, an island, or a sand dune, we could feel great interest in their work, but that kind of botany which sets a high value on a plant because it grew a few feet on the right side of an imaginary line does not appeal to us. Politicians may favor a State flora to tickle the vanity of their constituents and afford ground for a harmless sort of boasting, but what a real botanist wants with such a work is beyond us. Although the West is not entirely free from this taint the State flora is most prevalent in States that have been settled longest.

* * *

In most of the affairs of life it is a selfish spirit that animates us. It is hard to interest the mass of people in any new movement that will not benefit themselves, and usually not possible to interest them at all unless it affects their pocket-books. But to refuse aid to a worthy movement, simply because there is no immediate return in it for us, is often a short-sighted policy. At first glance the demand for government aid for good roads seems to be a class measure backed by the farmers on the one hand and the owners of automobiles on the other but this is a narrow way of looking at it. It is true that the farmer is likely to be the greatest gainer but those who live in cities will also gain in the lowered cost of produce brought about by the ease with which the farmer can carry such things to market. And is there a single person interested in botany that would not be the better for good roads, whether he owns his carriage or auto or is obliged to depend upon his own muscles for loco-

motion. With good roads we may be sure getting there and back with ease and celerity. Every plant-lover should be an ardent advocate for good roads. A government that can spend nearly four hundred millions a year preparing for war in a time of peace, can surely afford a few millions for roads and thus add to our peaceableness.

BOOKS AND WRITERS.

That there is in this country a regular weekly publication devoted to the study of nature may be news to many, but such a publication exists in "Records of Walks and Talks with Nature" edited by C. J. Maynard, West Newton, Mass. The publication is well along in its second volume and appears to be published for a small circle of students who take Saturday excursions with the editor. The little publication is deserving of a wider circulation.

If the unbotanical public fails to become familiar with our wild plants, it will not be the fault of the book-makers. Every time a new guide of a popular nature comes out we think the entire field has been covered, but presently another writer discovers a new short-cut to the flowers and shows us our mistake. The latest addition to the popular texts is the "Practical Guide to the Wild-flowers and Fruits," by Dr. George Lincoln Walton. This is designed for people who know nothing at all about botany and technical terms in consequence are reduced to the minimum. As in several other works the flowers in this volume are arranged according to color, but the author goes a step further and by means of easily understood keys has broken up these color groups into lesser divisions, characterized by the arrangement of the leaves, size of the flower, time of blooming, etc. If one is simply trying to run down the name of a plant, there seems to be no bet-

ter book for the purpose, provided the particular plant happens to be listed. In a work of this kind, of course, only the more noticeable plants come in for mention, and there is practically nothing in the text regarding their haunts and habits. In the second part of the book the fruits are treated in a similar manner. The book contains 225 pages and is published by The J. B. Lippincott Co., Philadelphia, at $1.50 net.

In Cummings "Nature Study for Primary Grades," issued by the American Book Co., we have what seems to the reviewer a series of very practical studies of common things that are not too technical for the pupils for which they are intended, nor yet so simple as to become babyish. We note with pleasure, also, an entire absence of the usual twaddle in which trees, birds and flowers sustain conversational parts. Pupils who use this book should finish it with an intelligent interest in the common objects of out-of-doors and a knowledge of such things that cannot fail to be of use to them in the more formal courses in science in high-school and college. The book deserves to be widely adopted.

In our opinion, the book "Wild Flowers Every Child Should Know," by Frederic William Stack, has a rather misleading title. Instead of a book on the wildflowers of special note as one would naturally expect to find, it is only another volume relating to the plants of the eastern states. Certainly we should never include the black sanicle, sow thistle, and pepper grass among plants that every child should know, unless it is assumed that every child should be familiar with even the weeds. As in so many of its predecessors the flowers in this book are arranged according to color, an arrangement likely to be satisfactory when closely adhered to, but we fear that anyone looking for a description of skunk cabbage, Jack in the pulpit, louse-wort or cancer-root would scarcely think of looking in the section devoted to red flowers. The greatest

fault of the book, however, is the lack of a key of any kind. The book then, is not so much an aid to finding the names of our showy wild-flowers, as it is an account of the plants when found. For this purpose it answers fairly well, the descriptions of the plants being cast in untechnical language and considerable attention given to the uses and folk-lore of the plants. One advantage the book has over others is the fact that the scientific names agree with the nomenclature that the botanists of the world have adopted. The book is illustrated with 48 good photographs and four plates in color. It is published by Doubleday, Page & Co., at the fixed price of $1.20.

Elizabeth H. Hall has written a little book on "Flowerless Plants," that is intended to interest young people in the ferns, mosses, lichens, mushrooms and seaweeds, and apparently will meet the end in view. In so small a book, the different groups can be treated only in a general way, but the author weaves into the subject a great deal of poetry and folk-lore. The reviewer is pleased to note in the book a great deal of the verse that he has written about ferns from time to time, though the pleasure is somewhat dampened by the fact that no credit is given. The numerous illustrations, some of which are in color, will doubtless add to the young people's interest in the book. It is published by Doubleday, Page & Co., New York.

The *Guide to Nature,* edited by Dr. E. F. Bigelow, signalled the beginning of its second volume in April, by reducing its price from $1.50 to $1.00 a year. The first volume contained nearly 500 pages which is about as much as anybody could expect for $1.50, but the reduction in price carries with it no reduction in pages. If the "Guide" does not become a success it will not be its fault or the fault of its resourceful editor.

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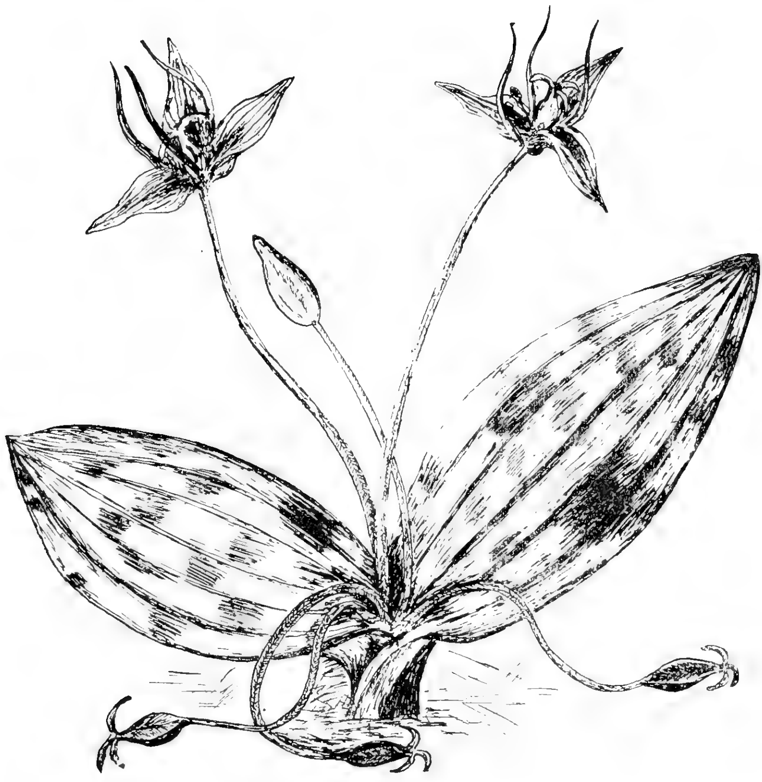

FETID ADDER'S TONGUE.—*Scoliopus Bigelovii.*

THE AMERICAN BOTANIST

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THE FETID ADDER'S TONGUE.

BY WALTER ALBION SQUIRES.

IT has always seemed something of a misnomer to call the little *Erythroniums* of the Eastern States, yellow adder's tongue, but there is in the West a species of plant related to the *Erythroniums,* whose reptilian characteristics are quite manifest. *Scoliopus Bigelovii* is commonly called Fetid adder's Tongue in California. Its broad mottled leaves are suggestive of the spotted puff-adders of our prairie states, and its flowers resemble the open mouth of a snake sufficiently to account for its common name. The narrow petals curved in front of the flower are not unlike the red flashing tongue of a snake, while the hooked stigma resembles the poison fangs of a venomous reptile.

The flower cluster is really an umbel though the stem of the flower does not appear above the ground. The separate flowers are pushed up one or two at a time. As soon as they are fertilized the sepals and petals fall off and the scapes become prostrate, lying on the ground and winding about the plant like tiny serpents—a kind of a plant Laöcoön. The flower has a delicate beauty suggestive of the orchids. Its purple-veined sepals and narrow wine-colored, snake-tongue petals are not exactly like any other flower we have ever seen. The plant, however, does not encourage close acquaintance. I once dug up a specimen to carry home, but the fetid odor of its blossoms was so nauseating that I decided to leave it in its native haunts.

The felid adder's tongue is one of our earliest spring blossoms. I have found it in blossom in January on the north

foothills of Mt. Tamalpais. It grows in dense shade on cold north slopes and seems to have a special liking for the shadow of the redwood belt. In the great redwood forests of Mendocino county I found it to be especially abundant. Under some giant of the forest, a dozen feet in diameter and more than two hundred feet high one is apt to find a colony of *Scoliopus* flourishing in the thick debris of leaves and twigs sent down from the branches in the sky. These pygmies of the plant would, it would seem, are ever loyal to the friendship of their giant Antaeus. An acquaintance with the forest goes far to dispel the book-learned theory that all nature is a heartless "struggle for existence." The forest is a world of plant co-operation and helpfulness. The removal of the trees means death to many humble dwellers of the shade, and when the lowly vegetation of the forest floor is destroyed by sheep, fire, or cultivation the lofty monarchs of the forest sicken and die.

San Anselmo, Calif.

THE SUMACHS.

BY FRANK DOBBIN.

HOW they flame out of some half-forgotten Autumn afternoon! A long hedgerow gorgeous as an Indian maid, or per chance some rocky upland pasture one blaze of color under the September sun, giving a foretaste of the grand color scheme that Mother Nature will presently work out by means of the poplars, maples and oaks.

Rhus typhina, well named the staghorn sumach from the resemblance which its branches bear to the antlers of a deer, is the most common of this interesting genus. Sometimes in favorable localities it grows to a height of more than thirty feet, while on the other hand if the soil be poor and thin it is forced to remain as a small shrub of two or three feet but still bravely fulfilling its mission in the world by bearing aloft its panicle of crimson fruit. When the March sunshine begins to

hint strongly of Spring the farmer's boy, independent of patent devices, seeks the patch of sumachs in the hillside pasture and there selecting the branches or main stems of the proper size and straightness, he proceeds to cut enough to furnish spiles for the coming "sugaring." Our grand-mothers too had a use for the sumach. They gathered the fruit or "bobs" as they were called, and by boiling them made a dye that would produce a fine shade of silver gray. When the sumach attains to any size, and it sometimes does reach a diameter of six or seven inches, the wood will be seen to be of a handsome shade of yellow varied by darker lines which mark the annual growth. It is susceptible of considerable polish and has a fine satiny luster. Although this shrub is somewhat of a nuisance to the farmer by persisting in sending out a skirmish line of young shoots into his cultivated fields yet that season "when the purple elderberries vie with the sumach's crimson stain" would loose much of its beauty were it absent from field and hedgerow.

A nearly related species is *R. glabra* or smooth sumach as the name indicates. A glance at the new shoots will be sufficient to identify it as they are smooth and glaucus, quite in contrast to the densely hairy shoots of the more common *R. typhina.* While walking beside the Champlain Canal recently I found the bank for some distance covered with this shrub. What a dash of crimson it must make on the landscape when the leaves take on their autumnal coloring! Another species of wide distribution is the dwarf sumach, *R. copallina,* easily recognized by the wing-margined petioles and the dark shining green of the upper side of the leaflets.

Any one who is a frequenter of swamps is familiar with *R. vernix,* the poison sumach or dogwood as it is often called. This is a handsome shrub but one much better to look upon than to handle, as anyone can testify who has been afflicted with its poison. It is said that the Japanese collect the sap of

this shrub and use it in the manufacture of the varnish for their celebrated lacquered work. A nearly related species furnishes the Wourali poison made by the natives of Guiana.

This genus also possesses another poisonous member in the common poison ivy, *R. Toxicodendron.* This plant loves to scramble over old walls and by means of rootlets which it sends out along the stem is sometimes able to climb to a considerable height. It has often been mistaken for the woodbine —usually much to the sorrow of the one making the mistake.

My first sight of the aromatic sumach, *R. canadensis,* was near the top of a steep cliff in southern Vermont. In such situations or on dry stony banks, it is usually found. Crush the leaves and it will be found that they have rather a pleasant aromatic odor; hence the name *R. aromatica* by which the shrub is sometimes known. The ill-scented sumach or skunk-bush, *R. canadensis* var. *trilobata* is a western plant, common but beyond the range of the Eastern student. The smoke tree, *R. Cotinus,* which is often seen in parks and cemeteries is a sumach and is said to have sometimes escaped from cultivation. It certainly would be a welcome addition to our waste-land and hedgerow shrubs.

Shushan, N. Y.

ST. JOHNSWORT.

BY DR. W. W. BAILEY.

THE common St. Johnswort (*Hypericum perforatum*) is one of the many weeds adventive from Europe. Its English name is said to have been given from the fact that it begins to bloom on St. John the Baptist's day — June 24th. Here where I write, from a corner of the Old Bay State, this is certainly true.

If I desired to show a beginner how many curious things may be learned from a single plant, there is hardly one that I would prefer as a text. The young, especially, are ever in-

terested by such striking features, and some of them odd, which this plant presents. First consider the opposite and decussate leaves. That last term which sounds so like a swear word only means that the leaves, while opposite, cross each other in pairs, each succeeding couple alternating with the pair above and below, so as to fill the space and give each the best possible show for light and air. These elliptical leaves, when held to the light, and looked through are seen to be, as the books have it "punctate with pellucid and dark dots." In less technical language the foilage is spotted with many thin translucent places mingled with black spots like fly specks. These are seen also on the flowers.

There are five light yellow petals and the inflorescence is centrifugal, the middle flowers blooming first. The stamens are in three marked clusters united by their filaments at the base. The botanist says they are triadelphous or in three brotherhoods. The three divergent thread-like styles project from among these, capping a three-lobed capsule or pod. There are many other and quite different looking species of *Hypericum,* some of them native. Of these *H. ascyron,* formerly known as *H. pyramidatum* is the most showy. Its stems are from two to five feet high and the leaves from two to five inches long. The huge conical pods are apt to assume a ruddy color in ripening and are almost as handsome as the flowers. The plant is found on river banks from New England to Pennsylvania and the far west. A striking contrast to this splendid plant is the little orange grass or pineweed with heathlike leaves, minute flowers and red pods growing in sandy fields.

To return to the common species, few plants show more strikingly the effect of environment. In good soil it may be four or five feet high while on a dry road bed it is sometimes only an inch or two in height. In this last case instead of the many flowered cluster seen in favorable situations it may be

reduced to one flower. The same thing is often seen in the species *H. Canadense* which has a recognized variety *minimum.* I am not aware of any economic use for the genus. Most of its members may be classed as weeds though *H. ascyron* is well worth a place in any garden.

Touisset, Mass., July 1909.

REPRODUCTION IN APIOS TUBEROSA.

BY E. E. BALDWIN.

IN an article on the fruiting of *Apios tuberosa* published in the *Botanist,* last fall, it was noted that in the latitude of northern Illinois it seldom bears fruit which was something of a surprise to the writer. In this latitude, (Mississippi) this plant grows luxuriantly and flowers freely besides producing root tubers in abundance.

It is the law of the reproduction of those plants which reproduce themselves both by seed and by any form of subterranean growth and whose habitat while originally tropical has extended itself for any great distance above the frost line into the temperate zones, that, while in their original habitat they keep up both methods of reproduction, as they extend north or south from the tropics they gradually cease flowering and depend upon their root growth for reproduction.

The reason for this is obvious. In their tropical home the warm season is long and ample in length for the seeds to mature. As the season is shortened by reason of the increased distance from the tropics reproduction by the bearing of seed becomes more and more difficult and is gradually abandoned by the plant which conforms itself to the circumstances surronding it and gradually depends upon its root crop the more for reproduction.

Thus the sweet potato (*Batatas edulis*) while it flowers profusely and matures seed in Central America, in this latitude never flowers except late in the fall of an exceptionally

warm year and then does not mature seed but depends upon its tubers for reproduction. So also the Irish potato (*Solanum tuberosum*) thrives and produces tubers in abundance for a long stretch above where it can mature seed and in its most northern limits of cultivation is almost flowerless. The common cane (*Arundinaria macrosperma*) which in the tropics bears seed freely has in this latitude only borne seed twice in the past seventy years, (in 1873 and 1864), depending on its rattoons for reproduction.

So we see that the *Apios* in thus abandoning the bearing of seed and reproducing itself by tubers protected from the cold in the colder parts of its habitat in only obeying a common law of the reproduction of plants.

Norrell, Miss.

THE LOST STAMEN IN TURTLE-HEAD.

BY S. C. WADMOND.

LAST summer I had been down in the marsh of a Sunday afternoon, and with other things brought home some turtle-head (*Chelone glabra*), its long spikes looming up conspiculously in the flower vase. I happened to take a flower from one spike and split it open in an indifferent fashion when I became immediately interested, for I counted five perfect anther-bearing stamens! I remembered that this was uncommon amongst the Figworts, and so looked up the description of *Chelone* in the manuals. None of them made mention anywhere of the occasional or even rare occurrence of five antheriferous stamens in *Chelone*, *Verbascum* being the only genus in our Figworts which has five anther-bearing stamens. I hastened to slit open another flower and another, until several spikes were stripped, but all excepting the first showed the regulation four stamens with their curious woolly heart-shaped anthers, and a fifth sterile filament smaller than the others.

Many days thereafter I chanced to be glancing through

my first botanical text-book. Gray's "Lessons in Botany" and there was just the record I had been looking for. "In the Figwort family the fifth stamen appears in *Pentstemon* and turtlehead as a sort of filament without any anther, a thing of no use whatever to the plant but very interesting to the botanist since it completes the symmetry of the blossom, and to show that this is really the lost stamen, it now and then bears an anther or the rudiment of one."

I am convinced that it is only very rarely "now and then" that the lost stamen appears, for I examined hundreds of blossoms of turtlehead last summer, and never found another flower with five antheriferous stamens. The manuals say of *Chelone,* "Flowers white, often tinged with rose or pink." Our plant has decidedly cream-colored flowers without the slightest suggestion of rose or pink.

Delavan, Wis.

FLOWERS OF THE SALT MEADOWS.

JUST back from the white sands of the surf-beaten beach lie the salt meadows, soft with brackish ooze, odorous of fish and haunted by ravenous mosquitoes—a sort of no-mans'-land between the shifting seashore and terra firma. On breezy days of early autumn, when the wind drives the mosquitoes to cover, I love to push my boat far up some one of the many streams that dissect the sunlit marsh and see how nature's garden grows there; for even in so unlikely a spot as this, amid sedge and "black grass" does she set dainty flowers.

Here that lowly beauty, the seaside gerardia, lifts to us its chubby purple flower-cups. In our own Western land it keeps ever fresh the memory of old John Gerarde, for whom it is named and who loved plants as you and I do, and wrote quaintly about them in England more than three centuries ago. Here too, we may gather starry sabbatia without stint—that beautiful blossom like a pink five-pointed star wtih a yellow

center, that frequenters of the seaside all admire but few can call by name. It is abundant from Florida to Massachusetts; and along the coast of the old bay state people have given it the pretty name of "rose of Plymouth," though it bears no relationship to a rose.

Among the many sorts of goldenrod whose cheery blossoms on the threshold of the frost should be a stimulus to all who are disposed to autumn melancholy, none is more lovely than the seaside goldenrod, which luxuriates on the tonic salt of these meadows, often attaining a height greater than a man's. It is easily distinguished from other varieties by its smooth, thick leaves and showy clusters, consisting of flower heads which resemble miniature sun-flowers. They convince the most skeptical that goldenrods and sunflowers are indeed of one family.

Here and there certain flowering plants grow so closely together that the marshes are distinctly colored by them over considerable areas. One of these is the marsh rosemary, or sea lavender—a delicate, bushy little herb covered with tiny lavender-colored flowers. It is such a plant as you with to take home with you and set in a vase on your mantle-shelf, as indeed you may, and you will find that it will keep all winter long in its stems and persistent calyx cups a touch of color that will be a pleasant reminder of autumnal days.

But the great colorist of the salt meadows in the salicornia, or marsh-samphire. Every one who visits the seashore in September has seen and marveled at the crimson hue that covers the meadows then as with a mantle. It is due to the presence of myriads of these fleshy, leafless plants standing thick as blades of grass. The flowers are very minute and hidden away in the joints of the stem; and the stems, at first green, are not noticeable amid the general verdure until age reddens them. Then they gradually transform the entire complexion of the meadows.—*C. F. Saunders in Young People.*

THE DWARF SPLEENWORT.

Asplenium pumilum.

THOSE who have confined their fern studies to a limited region often have an erroneous conception of the range in form of genera that makes collecting in any distant country a series of surprises. Sometimes the impression of a genus is correct, as when we assume from experience with the cinnamon fern, the interrupted fern, and the royal fern, that all the *Osmundas* are large, but we are as likely to go astray in our judgment as we do when we infer from a few diminutive specimens that all the filmy ferns are as small and delicate. In general the smaller the genus the greater is the likelihood that the species composing it are all quite similar; indeed one of the reasons brought forward for separating our common boulder fern (*Dicksonia pilosiuscula*) from the other *Dicksonias* was that it differed from the others so much in size an habit.

In any large genus, however, it is usual to find a wide range in the size, shape and cutting of the fronds. The species are likely to begin with entire fronds, shade into pinnatifid or pinnate species and end with forms that are often many times compound. So, too, in the matter of size, there are species, small and inconspicuous, almost lost among the other herbage of their haunts and others that reach sizes that render it impossible for them to escape notice. After one has spent a day collecting polypodies so small that it is necessary to carefully examine the mossy tree-trunks upon which they grow in order to find them at all, it is an impressive contrast to find on the way home some species such as *Polypodium crassifolium* with fronds like broad-swords.

Nor do size and delicate cutting have any necessary relationship. The large fronds are as likely to be deeply cut as are those of small species but no more so. In the case I have mentioned both forms happen to have entire fronds, though one is possibly fifty times larger than the other.,Size very fre-

THE DWARF SPLEENWORT.—*Asplenium pumilum.*

quently depends upon habitat. In ground inhabiting species, there is usually no reason for a diminution in size, but those species which live upon trees, must keep their proportions within the bounds which their habitat places upon moisture, light and root-hold.

Some thoughts of this nature must pass through the mind of anyone who examines any extended series of tropical *Aspleniums.* At one end of the list is the great simply pinnate fronds of *Asplenium marginatum* like a gigantic *Asplenium angustifolium,* taller than a man and at the other is the little *Asplenium pumilum* chosen to illustrate this article. Although so small our fern does not grow on trees or rocks, but is to be found among the grasses and herbs on shrubby half open hillsides. The variation in the fronds presented by the fertile, and therefore presumably mature, plants would delight those botanists who thrive by making distinctions between tweedledum and tweeledee. A set of specimens could be selected that would make an unbroken series beginning with entire forms and ending with pinnate forms with pinnatifid pinnae. In drawing up a description of the species, the scientists have fortunately described the larger forms. Had they by chance first discovered only the small forms and described them, it is likely that the larger ones would have been considered distinct.

Like a large number of our spleenworts, the present species has black stipes with a tendency to become green as they approach the blade of the frond. The largest specimens are usually less than five inches high and being so inconspicuous, have failed to attract much notice. The species, however, is pretty widely distributed, being found in the West Indies, Mexico, Columbia, East Africa and India. The specimens illustrated were collected near Gordon Town, Jamaica by the writer in 1900. *Willard N. Clute in Fern Bulletin.*

DIATOMS.

DIATOMS are very small, one celled organisms, which are among the primal forms of life, and have apparently existed with little or no change from the earliest appearance of life upon the earth.

They are bivalves with shells of glass instead of lime, held together by side hoops of the same material instead of hinges. For many years after their discovery they were supposed to be animals, chiefly because of their power of locomotion, a very large proportion of them being rapid travelers during their whole lives. Several eminent scientists still hold to this opinion, but they are now generally regarded as belonging to the vegetable world. They vary greatly in size and outline, and are elaborately ornamented with sculptured markings, alae, striae, costae, etc., many of them being among the most beautiful forms in nature. Their shells being so largely silex they are comparatively indestructible, and where the conditions are favorable they often accumulate in vast quantities. Nearly every permanent body of water, however, small, contains them in greater or less abuundance; when this water disappears the diatoms are left as a fossil deposit.

Quite a number of these deposits are found in Bristol. A little over the line west of the lower reservoir of the Bristol Water Company is one of these deposits ;the stratum of diatoms is about two feet thick and covers one or two acres. It contains numerous species many of them large and interesting. When this reservoir was made, another fossil deposit was removed. On the farm of Silas Carrington is another deposit notable for the abundance of *Frustulia Saxonica*, well-known as a test object for the microscope; its markings are so minute as to require high powers and perfect lenses to resolve them.

On the old Lazarus Hird farm is a deposit showing an abundance of the very rare *Achnanthidium vexellum;* and north of this on the Mix farm is perhaps the largest deposit

in Bristol. It covers fifteen acres and perhaps more, and is of unknown depth. I have material brought up from a depth of 10½ feet, showing seven feet thickness of diatoms to this point, which probably continues down several feet more, but we could get no farther down on account of the rapid inflow of water. This deposit is remarkable as containing the beautiful little *Cyclotella antiqua,* which has never before been found in this country as far as I can ascertain. I have sent specimens to the most experienced collectors but none of them had ever seen it before. This Bristol form is more beautiful than any of the European specimens that I have seen.

All these fossil deposits, the ponds and streams mentioned, and many others contain hundreds of species, a full description of which would require a large volume; a mere list of their names would cover many pages. Very many of these are among the most remarkable and beautiful of the fresh water varieties. The filamentous kinds are found nearly everywhere in Bristol, and the species are very numerous. They resemble the Algae, except that they are brown instead of green, and each joint or cell is an individual orianism with an independent life of its own.—*W. A. Terry, Bristol, Conn.*

HABENARIA LEUCOPHAEA.—Another apparent effect of the wet season has been the unusually large number of fringed orchis on the prairies of central Illinois. This orchid is a moisture-loving plant, and lives in the low prairies where the soil retains the moisture, in company with *Phlox glaberrima, Asclepias Sullivantii* and other such plants. It is generally very rare, and the collector may consider himself lucky who finds more than one plant in bloom in a season. This summer, however, it has been rather abundant, and probably a hundred plants bloomed in this vicinity. This does not mean that there have actually been more plants this year than usual, but merely that more of them have bloomed.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their shorter botanical items. The magazine is issued as soon as possible after the 15th of February, May, August and November.

IMPATIENS PALLIDA ALBA.—Some time ago this color-sport of the yellow touch-me-not (*Impatiens pallida*) was reported from several localities in Pennsylvania, but so far as we are aware it has not been reported elsewhere. It will be of interest therefore, to record that it occurs in abundance at "Dellwood" about four miles north of Joliet, Illinois. Here it grows on the rocky banks of a small artificial lake and is accessible only by boat. As in the other cases reported, the flowers are quite like those of the type except that they are pale creamy white in color.

LINNAEUS AS A NAME TINKER.—It would seem from a letter which old John Collinson wrote to Linnæus in 1755 that those who change the names of plants and those who strenuously object to such changes have been ever with us. The following, though written more than 150 years ago, has a very familiar sound. Collinson writes: "I have had the pleasure of reading your Species Plantarum, a very laborious and useful work, but my dear friend, we who admire you are much concerned that you should perplex the delightful science of botany with changing names that have been well received and adding new names quite unknown to us. Thus botany, which was a pleasant study and attainable by most men is now become, by

alterations and new names, the study of a man's life and now none but real professors can pretend to attain to it. As I love you, I tell you our sentiment." And again he writes: "If you will be forever making new names and altering good and old ones for such hard names that convey no idea of the plant, it will be impossible to attain to perfect knowledge in the science of botany."

Plants and Nitrogen.—Although the air is nearly four-fifths nitrogen, most plants though absolutely dependent upon a supply of nitrogen for growth, can obtain none from this source. Certain bacteria living on the roots mostly of leguminous plants have the power to fix atmospheric nitrogen and pass it on to the plants upon which they grow, but plants in general must take their nitrogen in the form of nitrates dissolved in the soil water. According to the *Scientific American,* an English scientist has lately discovered that certain plants are able to absorb atmospheric nitrogen by means of the epidermal hairs with which they are covered. The nitrogen is said to be built up into protein within the plant hair and then passed on to the other cells of the plant.

Personal Generic Names.—A writer in a recent number of *Science* deplores the present tendency to name genera of plants and animals for persons of no great scientific importance and cities as illustrations *Perkinsia, Kellia, Mitchillina, Smithia, Jonesia, etc.* He says that these were all, no doubt, estimable gentlemen, but questions whether their names are commanding enough to deserve perpetuation in this way, to say nothing of euphony. These, however, pale into insignificance beside certain other "terrible examples" cited such as *Billingsella, Girardinichthys, Pilsbryoconcha* and *Tarltonbeania.* As regards this latter the author says it should be changed to *Tarlton-H.-Beania* to avoid a suit for damages

by Dr. Bean. Those who make the names of our genera are not the only sinners in this respect. Some years ago, an amateur botanist is said to have named a species from the Yellowstone, *Nationalparkensis!*

MULTICELLULAR PLANT HAIRS.—The epidermis of many plants produce hairs that are most wonderful and beautiful objects when viewed with the microscope or even a good lens. These hairs are by no means the simple things that one who has not seen them is apt to imagine. Besides the simple one-celled hairs that are most common, there are branched hairs, forked hairs gland-tipped hairs and multicellular hairs whose points radiate from a common center and form most interesting and delicate rosettes. The following species are among the best for showing the latter type of epidermal hair and some of them are always to be obtained during the growing season: *Viburnum lantana, V. Plicata, Deutzia scabra* (*crenata*), *Eleagnus argentea* and the species of *Shepherdia.*

AMERICAN MISTLETOE.—There are several species of Mistletoe in the United States but the one usually called American Mistletoe is *Phoradendron flavescens.* This is most abundant in the southern States though it is found in Southern New Jersey, Maryland, Ohio, Indiana and Missouri. In a recent bulletin from the University of Texas on the anatomy and some of the biological aspects of this plant several points of interest to the general botanist are given. The mistletoe is something of a botanist itself and selects only certain trees as hosts. In Texas the trees usually selected are mesquite, hackberry, elm, oak, ash, osage orange, prickly ash, pecan, gum, walnut, mulberry and china berry. In Austin, about 90 per cent of such trees are infested with Mistletoe. The seeds are distributed by birds, to whose bills and feet the sticky outer covering of the seeds adhere, and do not begin to grow until exposed to proper conditions of temperature and

moisture. The embryo is well supplied with chlorophyll and the endosperm, by which the seed is surrounded, also contains chlorophyll and apparently is able to make additional food for the young plant. The cotyledons are very closely joined to the endosperm and absorb nourishment from it. The Mistletoe seldom fails to deform and often kills the plant upon which it grows, notwithstanding the fact that it is not wholly a parasite and makes some of its food.

Valuable Pollen.—It may surprise some people to learn that even such an apparently insignificant thing as pollen may be valuable enough to guard from thieves. At a recent orchid show in England, all sorts of precautions were taken to prevent envious orchid hybridists from carrying off the pollen. The present race of cultivated orchids are nearly all the products of various crossings. Occasionally an unusual hybrid sells for thousands of dollars. Those who have plants that are likely to bring crosses of this kind are, of course, very careful to see that none of the pollen gets into the hands of competitors. The latter, however, by visiting the exhibits of fine orchids may carry away the precious pollen and make crosses of their own. Some pollen if properly cared for may remain good for six months and be sent half way around the world. Therefore if you have any unique specimens of orchids remove their pollen masses before allowing them to visit the flower show.

The White Pine Rust.—The white pine is threatened with a new disease that, if allowed to spread, will practically exterminate this invaluable timber tree in America. This disease is the European blister rust (*Peridermium strobi*) which is well-known in Europe but which has but lately appeared in this country. This rust has the peculiar habit of requiring two different kinds of plants upon which to complete its life history. One of these plants is the common currant or gooseberry.

When found on these plants its identity with the pine rust was not known and it was named *Cronartium ribicola.* The rust begins on the currant or gooseberry in spring and spores from these plants are blown to the white pine where the damage is done. Later spores from the white pine start the infection anew in the currant. The spores from the currant can infect either the pine or other currants, but spores from the pine seem able to infect only the currant. The fungus invariably kills the pine in a short time. Its appearance in this country is due to the fact that it was imported with white pine seedlings.

A New Form of Burdock.—In *The Plant World* for June, Harry B. Brown reports the finding of a laciniate leaved burdock near Jessup, Indiana, in 1907. The lower leaves were thick, ovate, acute and irregularly laciniate, and the inflorescence was irregular with numerous small sterile flowers. This same variety has been found in two different places about Joliet, Illinois, during the present summer, and it has also been found near Champaign, Illinois. A peculiar feature of the Joliet and Urbana plants is the large and conspicuous light colored veins that ramify through the leaf. All the plants were whitish downy. The plant apears to the writer to be a mere sport of the familiar *Arctium minus* but since it may be better handled if named it is suggested that it be called *Arctium minus* f. *laciniatum.* Since the burdock is a European plant it is likely that this form has been observed and named before but thus far the writer has found no record of it.

Effect of Selection on Corn.—We do not always realize how widely a single species may vary. Some experiments carried on at the University of Illinois for the past six years has shown a remarkable amount of variation in the corn plant. The purpose of the experiment was to discover what could be done to change the height at which the ears were

borne. Accordingly seed was selected from two types, one with ears near the ground and one with high ears. Each succeeding year seed was selected from the plant showing the greatest variation and now the following difference may be noted: In the high-ear plot, the average height of the plants is 114 inches, that of the low-ear plot 79 inches; in the high-ear plot, the average height of the ears from the ground is 60 inches, that in the low-ear plot 27 inches; in the high-ear plot the number of internodes below the ear averages eight, in the low ear the average is four. All this has been accomplished without crossing by simply selecting the most characteristic plants from which to breed. No doubt any other plant would show similar variation under similar methods of treatment.

Improving the Wildflowers.—The statement that no two blades of grass are just alike has been reiterated so frequently as to be commonplace, and we apparently often fail to grasp the significance of this diversity to the cultivator of plants. Since plants do differ, not only in their leaves but in their flowers, fruits and other parts, we can frequently make choice of the good or the bad in the same species and by careful selection soon have much finer plants than the common run afield. No matter what wild plant you admire most, it is probably within your power to have better specimens of it than you have ever had before. Take the hepatica, for instance; if one chooses, he may have clumps in which the flowers are of the deepest shades of blue others pure white, others deep pink or still others of paler shades of blue and pink. He may have three-lobed or five-lobed plants, with the lobes sharp or blunt and all this by selection. The finest plant of any species probably does not grow in the nearest field but by searching long enough in many fields one may find it. It is very certain that we do not value our native plants as highly as their beauty warrants. In England a multitude of our com-

mon wild things are carefully cultivated and there receive the admiration due them. We, too often, pass these fine plants by, in the desire for the imported novelties of florist and nurseryman.

Death of Mrs. Asa Gray.—Mrs. Jane Loring Gray, wife of the famous botanist, died at Pride's Crossing, Mass., July 29, 1909, at the age of 84 years, having survived her distinguished husband more than twenty years. Mrs Gray was a native of Boston and after the death of her husband continued to reside in the curator's house in the Harvard Botanical Garden at Cambridge where the funeral was held.

England's Earliest Flower.—Notwithstanding the fact that London is situated in the latitude of Labrador and therefore much further north than Montreal and Quebec, the climate is so mild that some plants are able to bloom throughout the season and therefore in strict truth England can have no earliest flower. In commenting on our recent query as to our earliest spring flower, *The Gardening World* says: "In some part or other of Britain the Christmas rose (*Helleborus niger*) may be seen in bloom in November and from that time more or less till February. Then we have *Galanthus nivalis octobrensis* which flowers in October although its congeners bloom any time from Christmas till April in Britain. These are followed by the winter aconite (*Eranthis hyemalis*) in February from which time crocuses, daffodils and other bulbs keep up a display till June. In referring to wild plants there are some which bloom any month in the year provided the winter is mild. This includes the daisy concerning which the poet says, 'The rose has but a summer's reign, the daisy never dies,' nevertheless we have seen hybrid perpetual roses in the neighborhood of London at Christmas and in the neighborhood of the sea on the south coast quite in abundance."

FIELD BOTANY

Edited by Dr. H. A. Gleason, Urbana, Ill.

May-apples are ripe in August. Just why the plant should bear the name of May-apple, is not quite clear. W. H. Gibson, in his admirable "Sharp Eyes" hints that it is only a mock May-apple, an imitation of another May-apple in New England. Mr. Gibson and Dr. Gray neither express a very good opinion of our well-known *Podophyllum peltatum*.

"The May-apple of New Jersey and southward," says Mr. Gibson, is a true fruit which follows a large white flower, and Dr. Gray, the botanist, says 'it is eaten by pigs and boys!' Think of it, boys! And think of what else he says of it: 'Ovary ovoid, stigma sessile, undulate, seeds covering the lateral placenta each enclosed in an aril.' Now it may be safe for pigs and billy-goats to tackle such a compound as that, but we boys all like to know what we are eating, and I cannot but feel that the public health officials of every township should require this formula of Dr. Gray's to be printed on every one of these big loaded pills, if that is what they are really made of."

Gibson evidently doesn't appreciate the flavor of the May-apple, if we may believe his half-humorous, half-sarcastic remarks. But James Whitcomb Riley, who is a true Westerner, was evidently of a different mind, when he wrote:

"And will any poet sing
Of a richer, lusher thing
Than a ripe May-apple rolled
Like a pulpy lump of gold
Twixt the thumb and finger tips,
And poured molten through the lips."

And what is more, Riley knew how to eat the May-apple, for his little verse tells exactly how it is done.

Habits of Foreign Plants.—Most of the ordinary weeds that are so common in gardens, along streets and in vacant lots are foreign species that have become naturalized in this country. Many of them have followed man for generations, and are just as intimately connected with him as the rat, the mouse, or various kinds of insects. They have frequently lost the habit of living with plants in natural surroundings, and are completely dependent on the presence of man. Accordingly, such plants are uncommon in the woods, the prairies, or elsewhere where the original vegetation has been undisturbed. They seem unable to compete with native vegetation or to make a place among native plants. On the other hand most of our natives plants are soon killed by cultivation or other disturbance of their environment, and consequently do not persist as weeds. Our commonest garden weeds are annuals and produce a large crop of seeds. Most of them bloom during the late summer, when the garden plants are the largest and cultivation the most difficult. Examination of an ordinary vacant lot will usually show that forty to seventy percent. of the plants are foreign, while a similar census of an area of timber some distance from a dwelling will reveal less than five percent. of naturalized plants.

Botany Under a Tree.—On the campus of the University of Illinois stands a large austrian pine with branches close to the ground. The men with the lawn mowers trim the grass around the tree, but never try to get under the numerous spreading branches. This makes a retreat where a number of plants may grow which are not found elsewhere on the campus, and at the same time illustrates very well some interesting features of the migration and colonization of plants. Every year the wind blows thousands of seeds of many kinds of plants across the campus, but only those which are fortunate enough to stop in some such sheltered place as this ever have a

chance to grow. Such species are the hedge-mustard, (*Sisymbrium officinale* var. *leiocarpum*), lamb's quarters, (*Chenopodium album*), pigweed, (*Amaranthus albus*), and some other common weeds. Then birds find the tree a convenient place to roost, and bring in the seeds of many other plants, such as pokeberry, Virginian creeper, Japanese ivy, mulberry and nightshade. Most numerous of all, however, are the seedlings of trees with winged seeds, including the elm, box elder and green ash. These seeds are blown in by the wind from trees near by. In all about twenty-five kinds of plants are found beneath the tree in an area of not more than three hundred square feet.

Another Growth-ring.—In a preceding issue a number of different forms of growth rings were mentioned. A more peculiar one has been common this summer in meadows and pastures, formed. by the slime-mould *Physarum cinereum* Slime moulds are small simple organisms, sometimes considered to be fungi and sometimes regarded as animals. The plant body is a slimy mass of naked protoplasm, which has a slight power of locomotion. When it is ready for reproduction, it creeps up the stems and blades of the grass where it is living and develops conspicuous gray powdery masses of spores. Gray rings, where the grass is covered with the spores, have been common this summer, probably because the frequent rains have been favorable for the growth of the slime-mould. The largest of them are six to eight feet in diameter. No adequate reason has been given as to why these plants live in rings.

Other Plants in Strange Places.—The ecologist believes that if the external conditions are right for a plant, in any place, and if the plant has adequate means for migration, the plant will sooner or later be found there. Many years ago a railroad crossed a deep valley by following a ravine from the

uplands down the valley. Since then the track has been changed, but the flat, vacant, unkept roadbed still lies along the sides of the ravine surrounded by dense woods. The trees have not yet had time to grow up and most of the roadbed is occupied by jungles of blackberries. Here and there the drainage is not good, and small pools of water have collected. To these have migrated bulrushes blue flags, cat tails, and several other swamp-loving plants, which look decidedly out of place on the steep hillside a hundred feet above the valley. The most interesting plant of all is the water cress, (*Radicula nasturtium-aquaticum*), which is growing luxuriantly in one small shaded pool. The water cress has small seeds, and we may suppose that they were brought from some other pond in mud, adhering to the feet of birds. Elsewhere along the same embankment prairie plants have established themselves, and black-eyed Susan, prairie coneflower and tick trefoil grow only a few feet away from hepaticas and wild hydrangeas.

Another Interesting Migration.—The University forestry plantation has afforded many illustrations of the movement of plants from one place to another, and scarcely a year elapses without one or more new invaders appearing. Most of these are carried by the birds, which come in enormous numbers to the forestry to roost; many others have seeds distributed by the wind, while some cannot be accounted for. The particular case in point is the twayblade, (*Liparis lilifolia*), a single plant of which appeared and bloomed during the spring. Twayblade has been found in this country, but not for many years. It certainly does not grow within a radius of ten miles from the forestry, and has been considered extinct within the county. Just where it came from, or how its seeds travelled, are matters that can not now be explained.

EDITORIAL

Within the past few years, the study of botany in schools has changed very rapidly. Not long ago, high school botany consisted in learning the meaning of the terms in descriptive botany, the tracing of plant names, the "analyzing" of flowers and the making of an herbarium. This phase of botany still holds in some sections but is fast giving place to a newer botany that, while founded upon it, differs widely in treatment. By the old method the student learned of roots, stems, leaves and flowers for the sole purpose of being able to discover the names of plants by the use of a key; at present he studies these same organs to discover of what significance they are in the organization of the plant and may spend an entire year in botanical studies without coming in contact with a key. The first half year, at least, of any good botanical course now endeavors to give the pupil an understanding of how the plant lives, how it takes and makes its food, how it reproduces, how it disseminates its seeds, how it is adjusted to its surroundings and the part each organ plays in the work. In the old books, photosynthesis, respiration, transpiration and osmosis were rarely mentioned and pollination was confused with fertilization; now these matters cleared of this obscurity form the groundwork of the course. When the new phase of botany first came into vogue, it was taught, like the old, by the recitation method. Structures and processes were described and the student was expected to read and remember. But the question early came to the teacher, Why not study the plants themselves instead of studying about them? Acting upon this suggestion botany became a laboratory study. For a long time, however, it was hampered by the attitude of the books devoted to the subject. In these the authors, accustomed to describing plants and plant processes, continued to describe the things to

be seen with the result that the pupil was usually willing to take the word of the book for it and rarely got up interest enough to investigate for himself. More recently a new type of manual is beginning to appear. In this the pupil is given a series of outlines containing questions that can only be answered by a careful study of proper material. At last botany has become a live study. There is now a object in studying plants not connected with the requirements of the teacher. Something new is to be discovered daily and discovered in such a way that it does not easily slip out of the memory. The great object now is to so word the questions that none of the pleasures of discovery shall be with-held from the pupil. To meet this demand there is now offered a little manual entitled "Laboratory Botany for the High School" by Willard N. Clute. It is published by Ginn & Co., and aspires to cover a year's course in botany, but is is so arranged that the first part of the book will properly fit the course in schools where but a half year is devoted to the subject. It should meet the wants of the inexperienced teacher, espcially, since it gives a list of materials needed for each study, tells where to get and how to preserve them and how to present the subject in class. It can be used with excellent results in schools lacking laboratory facilities as no complicated apparatus is required for the work outlined. In addition it will fit practically any text. The second part of the book is devoted to the evolution of the plant world, beginning with the simplest types and tracing the rise of flowering plants by studies of typical specimens of algae, mosses, ferns, fern allies, etc. The book contains several unique features, among which may be mentioned a list of definitions following each study, a key to the trees, outlines for floral ecology and tables of plant groups. It is written by a high school teacher for high school pupils with the sincere wish that by its use the study of plants may gain in attractiveness.

BOOKS AND WRITERS.

Goings "With the Trees" a book of popular information, has recently gone out of print.

A new magazine devoted to the natural history of the middle west has appeared under the title of *The Midland Naturalist.* It is to be published bi-monthly at Notre Dame, Ind., under the editorial management of J. A. Nieuwland. The first number was issued in April and contains a variety of articles on plants and animals.

The Amateur Naturalist, after weathering the vicissitudes of this life for several years has been merged with the *Guide to Nature*. The *Naturalist* filled a niche all its own and we are sorry to see it cease publication. Like most of the magazines devoted to natural history, however, it was run largely for the editor's pleasure, long experience having shown that there is no money in such ventures. Thus it happens that when the editor gets overloaded with other work connected with breadwinning or finds automobiling more enticing than type-setting the magazine has to stop.

Still another botanical publication has issued from the New York Botanical Garden in the shape of a fungus journal to be known as *Mycologia.* This makes the ninth serial publication for which New York is responsible, but while pleased at the unusual activity which so many publications denote we cannot help feeling that instead of so many thin little publications at exorbitant prices it would be far better to combine them into one or two dignified serials like those of Missouri Botanical Garden. It is certainly exasperating to be obliged to subscribe to so many publications in order to keep up with things botanical. *Mycologia* is a continuation of the *Journal of Mycology* edited by the late Dr. W. A. Kellerman. It is a bimonthly of about 36 pages and costs $3.00 a year. The numbers are not sold separately, but would cost at the rate of 50

cents for each 36 pages if they were. At such a price we fear that mycology stands in no danger of being popularized from this source. Dr. W. A Murrill is the editor of the new magazine which also has a list of thirteen associate editors in this and foreign countries. The first number contains a colored plate of fungi and five articles of interest to mycologists.

Doubleday, Page & Co., the well known publishers have recently decided, in the interests of their readers, to print no more books in type smaller than 11-point, the type in which this magazine is set. This is a commendable move and we hope to see other publishers soon follow so good an example. The American people are a nation of readers and should not be obliged to injure their eyes in trying to read fine print.

Everywhere the interest in the teaching of agriculture in the public schools is on the increase and books intended for pupil and teacher are appearing in constantly growing numbers. Many of these books appear to be written to meet a fancied demand for teaching certain phases of the subject, and while possessing many good points are not adapted to use in the average school. This criticism, however, cannot be brought against a recent volume entitled "One Hundred Lessons in Agriculture" by Aretas W. Nolan. This strikes the reviewer as an extremely practical and practicable book. Instead of studying descriptions of farming operations, the pupil is set to studying them at first hand. At the beginning of each study is given the object of the study and a list of necessary materials and then a series of questions guides the pupil to his results. These questions we rejoice to see are not such as can be answered except by a study of the materials. In addition to giving the pupil a knowledge of farming, this book seems likely to make him a pretty wide-awake and observant individual. Although a book for schools, most of the studies are intended for work out-doors which is exactly as it should be. We are gradually getting over the notion that the only learn-

ing of value is found in a book and the only good teaching is in the school building. The book contains nearly three hundred pages and is well illustrated. It is published by the Acme Publishing Co., Morgantown, W. Va., at 65 cents.

Another recent nature book is "The Study of Nature" by S. C. Schmucker. This is one of the volumes in Lippincott's Educational Series, and is designed for the teacher rather than the student. It is divided into three sections considering respectively the theory, the materials and the course. The most noteworthy of these is the section devoted to materials in which will be found much useful matter relating to the plants, animals, etc. To the reviewer the course outlined does not seem particularly strong and the list of "helpful books" is not what would be called a representative one. Teachers, however, will find it a very desirable addition to their books and may gain much help from it.

In some quarters the loose-leaf system of note-books has taken hold upon the schoolmen and several books have been issued in response to this demand. One of the latest of these is Meirs' "Plant Study," issued by Ginn & Co. The most important feature of this work is the handy form of binder which makes the addition of new pages or the removal of old ones a very simple matter. At the top of each page are a series of directions for study, and drawings are intended to be made on the blank part of the page. To the reviewer the directions for study seem indefinite to be followed by school children alone, but they may work out well enough in the hands of a competent teacher. The scope of the course outlined is the part of the work open to the most serious objections. It is apparently designed to cover a single half-year in which a large part of the work consists in "analyzing" flowering plants. In most communities this form of "botany" is decidedly on the wane and we hope to see it disappear entirely in time. Assuming, however, that our public schools are

still "hitting the high places" in botany with a half-year given to the subject, the author has given them a good form of note-book for the purpose. Our complaint is not against the author, but against a system of botany teaching that makes such a book desirable. We believe that there are many phases of botany of greater importance than that of filling out of blank forms with descriptions of plant parts, but we are well aware that the average teacher of botany does not think so. Until the day dawns when they do, "Plant Study" will answer their purposes better than any other book we have seen.

At the time of his death, the late H. Marshall Ward, was engaged upon a series of tree-books which was to include a volume devoted to each part of the tree. At the time of his death three volumes had appeared and two volumes have been issued since, under the editorship of Percy Groom. The latter two deal with fruits and form. The same general scheme is followed for each volume. There is first more or less matter applicable to trees in general, followed by a special treatment of the trees in the British flora. The books are very fully illustrated and while designed primarily for use in Great Britain will be of much use to American readers. The general part of each volume goes exhaustively into the variations of the parts of the tree and the flora of the world is laid under tribute for illustrations. The books are published by G. P. Putnam's Sons, New York, at $1.50 each.

Prof. J. H. Schaffner has recently issued in the "Proceedings of the Ohio State Academy of Sciences," an account of the "Trees of Ohio and Surrounding Territory," which is certain to be of great value not only to the students of the central west but to those of the whole territory covered by the botanical manuals for the Northern States. In addition to the trees native to the region, all the principal cultivated species have been included. The keys offer a variety of ways for determining the species there being keys for both the summer

and winter conditions. We regret to note, however, that the nomenclature used is a purely local one and does not agree with that adopted by practically all botanists. In the descriptions of the species the salient features have been siezed upon and even the novice ought to be able to name his specimens by the use of this book.

I. Dorfler of Vienna, Germany has begun the publication of an international botanical journal to be known as *Dorfleria.* The first number bears date of May 15, 1909 and contains 64 pages of text in which are listed the contents of the current numbers of the botanical magazines of the world. In addition there are notes and views of botanists and various longer botanical articles.

The regular edition of Britton and Brown's "Illustrated Flora" has recently gone out of print and only a few copies of the work in half morocco remain unsold. These latter are now held at $18.00 a set. The volumes were printed from type and it is unlikely that they will ever be reprinted. But it would be an excellent thing if the cuts and keys could be reprinted in a single volume.

The Philadelphia Botanical Club has recently issued the first number of *Bartonia,* a botanical annual which will be the official organ of the club. The first number is a very creditable piece of work, well printed, and containing, in addition to a brief history of the club, by the editor, Stewardson Brown, accounts of various botanical trips made by members and a list of those belonging to the club.

The new edition of Gray's Manual was issued less than a year ago but in this short time a large number of errors have been found in it. In the March number of *Rhodora* nearly 30 pages are used to list these errors with corrections. This list, however, is an excellent thing since it serves to keep the Manual up to date. It is likely that other lists will appear as further study changes our view of the plant.

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CONTENTS

WILLARD N. CLUTE & CO.
JOLIET, ILLINOIS

CAMASSIA ESCULENTA.

THE AMERICAN BOTANIST

VOL. XV JOLIET, ILL., NOVEMBER, 1909 No. 4

THESE wintry nights against my window pane
Nature with busy pencil draws designs
Of ferns and blossoms and fine spray of pines,
Oak-leaf and acorn and fantastic vines,
Which she will make when summer comes again,—
Quaint arabesques in argent, flat and cold,
Like curious Chinese etchings.—By and by,
Walking my leafy garden as of old,
These frosty fantasies shall charm my eye
In azure, damask, emerald and gold.

—Thomas Bailey Aldrich.

CAMAS

By Walter Albion Squires.

THE genus *Camassia* is represented in the Eastern States by a single species, *C. Fraseri.* It seems to be rather sparsely scattered over the region extending from the mountains of Pennsylvania and Georgia to the edges of the Great Plains. I have found it near the source of the Neasho river in Kansas. This is probably near its western limit. I have never seen a locality in the East where this camas made up any considerable part of the flora; but as soon as one crosses the Great Divide and begins to descend the Pacific slope the different species of camas begin to be abundant and in some places they make up a large part of the vegetation. Five or six species are found in the West the most abundant being *C. esculenta.*

In the early days this plant was exceeding abundant on the prairies of eastern Washington and northern Idaho. Old settlers of Camas Prairie in northern Idaho tell how, when they first reached the summit of Craigs Mountains, the whole

magnificent plain lay stretched out beneath them, blue as a summer sea with these blossoms. Agriculture and herding have driven the camas in large measure from the Clearwater and Palouse prairies. It is now to be found only in fence corners and out-of-the-way places; but farther back in the midst of the forests are many meadows where it still flourishes. These meadows vary in size from an acre to several hundred acres and all are encircled by the dark wall of the forest. Some of the larger meadows have been "taken up" as homesteads and the settlers cut the camas every year for hay. The word camas is derived from the Indian name for the plant. As is usual with primitive peoples the names was not re-restricted to one kind of plant but was applied to several species which do not belong to the genus *Camassia*. One species of *Brodiaca* was called "blue camas" and a certain poisonous *Zygadenus* was called "death camas." Camas bulbs formed the chief food supply of some of the Indians of the Northwest. They baked them in pits dug in the ground until the bulbs crumbled into a white starchy powder which was their flour. It was the encroachment of the whites upon the "camas grounds" of the Indians which lead to the Nez Perce War. It was during this war that the remarkable retreat of Chief Joseph and his followers took place. Encumbered with women, children and baggage, the Indians crossed the Bitter Roots into Montana, then made their way to the National Park and turning northward were within a day's march of the Canadian line where they were captured by Gen. Miles. It was only another chapter in the pathetic story of that race which since the coming of the white man has been fighting a loosing fight for the land of its forefathers. Many of the captives never saw their native haunts again. They were sent far away to pine away their lives in the fever-stricken hated "hot lands" of the Indian Territory, while they longed for the cold springs and green prairies of their beloved "camas grounds."

San Auselmo, Calif.

SOME WILD FRUITS OF ALBERTA, CANADA

By W. M. Buswell.

WHEN people go berrying here they are usually after "saskatoons," as the North-west June berry (*Amelanchier alnifolia*) is commonly called. The berries are flat and tasteless compared to most berries used in the East, but as they are the only fruit that is found in large quantities here they are very acceptable. They are used for sauce and for pies, and put up in cans for the winter. A species of smooth fruited gooseberry is fairly common and these berries are often used with the saskatoons which improve them greatly. Although both kinds are fairly abundant every year they are more prolific every other year. Red raspberries are very plentiful along the river and in some groves on the prairie and seem to bear fruit equally well every year. The berries begin to ripen about the middle of July. Wild strawberry plants are very common and they blossom very freely in the Spring but the amount of fruit produced is very small compared to the number of blossoms.

Another berry that is very common in coulees or any place where there is timber is the cranberry (*Viburnum pauciflorum*), as it is called here. These bushes form the principal undergrowth of all timbered tracts. People make what they call cranberry butter, or cranberry jelly out of the fruit and it is very nice when made up in this way, but the berries are not fit to eat from the bushes as they taste much like a soft rotten apple. The bright red fruits hang on the bushes all winter if not eaten by the birds and do not seem to be affected by the severe cold weather.

In the Eastern States we did not consider choke-cherries of any use whatever, but they find uses for them here, making a jelly of them which is much better than one would expect. I have also seen them cooked and used for sauce, but I never cared to try them that way as there seemed to be too many

stones for the amount of sauce. Bird, or pin cherries are very common and are often used for jelly, but the birds do most of the picking.

Both species of *Shepherdia* or buffalo-berry are common here although *S. argentea* is the only one bearing edible fruit. Most of the bushes here seem to have been partly killed by fires and do not produce a great amount of fruit. The berries are very acid and are among the best for jelly if they were more abundant. The other species (*S. canadensis*) seldom bears any fruit although blooming freely in the spring. The berries are insipid and of no value anyway. Both the plants and their fruit differ greatly and from their appearance would hardly be considered as belonging in the same genus.

Although one of the first plants to bloom they are among the last to ripen fruit. Usually they are not ripe until the last of August or first of September. Some of the ranchers call the buffalo-berries (*S. argentea*) bull-berries, but whether buffalo or bull these bushes would be much easier handled if dehorned. The branches all end in sharp points like the thorns of the hawthorn.

These are the only edible berries of any value I have found here but there are others that help to feed the birds and squirrels. The red osier cornel is very common and the berries are eaten by several species of birds. Flickers and sparrows seem to prefer them to many others.

One of the most common small shrubs, that seems to take the place of the hardhack of the East is the wolf-berry (*Symphoricarpos*) commonly called buck-brush by ranchers and homesteaders. The small white berries are eaten by several species of birds. The smaller species (*S. racemosus* var. *pauciflorus*) is fairly common, fruiting at the time the other species is in bloom.

Silverberry bushes (*Elaeagnus argentea*) are common everywhere, but I would not consider the berries fit for food,

although Gray calls them edible. They consist mostly of one large seed surrounded by a dry greenish powder and a rather tough light green skin. They are one of the sweetest flowered plants we have here and would be useful for that reason if for no other. Bunch-berries are common under trees in coulees as is also the dwarf raspberry (*Rubus triflorus*) but neither are very valuable as a food.

South and east of here there are large tracts of open prairie where there are probably no berries of any kind while farther west toward the mountains there may be more or different species, but this locality, along Battle River, probably has most of the species found in this part of Alberta.

Flagstaff, Alberta.

CLEISTOGAMY IN THE VIOLET

CLEISTOGAMY, or close-pollination, in unopened blossoms, is a curious illustration of Nature's occasional parsimony. The lavish hand with which she is wont to distribute pollen, amounting to over 3,000,000 grains to the flower in some wind-fertilized plants, is withdrawn in the case of the closed violet blossom, which she restricts to a paltry 100 grains. It is recorded that some years ago, before the great pine area of North Carolina had been denuded of its forests, cities as far away as Reading, Pa,. occasionally had their streets covered with a layer of fine, yellowish powder, and the uninitiated declared that it had rained sulphur during the night. But it was the golden rain of pine pollen from the far-away forests of North Carolina. Pine pollen has even been known to form a yellow scum on the ocean far at sea, and whales have feasted on it. Even the humble rag weed has distinguished itself by shedding its clouds of minute pollen dust in such quantity that it has penetrated into the heart of great cities and invaded office buildings, much to the discomfiture of susceptibles to hay

fever, who must seek refuge abroad, where rag weed is unknown, or hie themselves to some altitude where the pollen cannot reach.

In striking contrast to this prodigality of nature in pollen production, where she is compelled to use the wind as her transfer agent, is her close-fistedness in cleistogamy, where the pollen packet is delivered direct from anther to stigma without the intervention of bug, bee, butterfly or wind. The cleistogamous flower itself has the appearance of a bud arrested in development. It does not open until the seeds are ready for distribution. Here is an instance of a close corporation in the floral world; outsiders like the bee and the butterfly are not invited to its board. The running expense is reduced to a minimum; there is no outlay for petals for advertising purposes; no honey is provided for the entertainment of unnecessary visitors; the production of pollen is cut down, the stamens reduced in number and size; the pistil is abortive, with only the vestige of a stigma, while the manufacture of perfume is cut out altogether. When the seeds are ripe and ready for delivery the capsules splits open on three sides, the three valves assume a horizontal position and then the edges fold together with a powerful twist and the ripe seeds are expelled with considerable force to quite a distance, much in the same manner as you would shoot a moist apple seed between forefinger and thumb and land it on teacher's desk when she wasn't looking.

With all this close-fisted frugality in reproductive outlay the tribe of violet increases prodigiously, and perhaps outstrips many flower families which keep open house all season and entertain all comers with a lavish expenditure for gold-dust, honey-sweets, perfumery and general floral display. The purpose and importance of cleistogamy, with its small accessory, apetalous, scentless, nectarless, abnormal flowers is quite unknown, but many plants have adopted it, notably among our own flora, jewel weed and oxalis. Perhaps it was a happy

thought on the part of nature to demonstrate her ability to accomplish great things with small means and teach us economy. —*Philadelphia Record.*

THE NOVEMBER WOODS

By Dr. W. W. Bailey.

EACH season presents its own peculiar beauties. November, often regarded as cold and chill, the death time of the year, has a special charm for those who love the woods. While most of the leaves have fallen, and either lie in sweet smelling heaps by the pathway, or are driven in wild mazurkas by the wind, a few wine-colored, tawny, bronze or amber tinted still remain untouched. Oaks, for instance, are never more picturesque than now as the light shines through their persistent foliage. Again, the walker is very much impressed by the yellow, or ochre or siena colors of many grasses. Those along the salt marshes are particularly lovely while on sandy upland banks one notes the feathery plumes of *Andropogon.*

This leads us to speak of the varied means of distribution which nature employs to scatter fruit and seed. The object of such dispersion is to remove the young scholars, if we can so call a seed, from the too direct and overshadowing home influence. A little observation during the season, only, goes to show that wide distribution is not so much aimed at, as new chances and improved environment. Thus if one watches the aeronautic ventures of thistles or dandelion or milkweed he will be surprised to find that many times the balloon or parachute is empty. The passenger has stopped in his own country or, in other words, seed or fruit have become detached near home. Of course, there are times in tempest or gale when winged or plumose fruits and seeds are whirled to remote distances but it is not the rule.

Another mode of dispersal is duly impressed at this season upon the pedestrian, who finds his clothes lined with burs

or prickly pods. Nature is very fond of this grapnel method of seed distribution. She may employ simple spines as in cockle bur, or hooks as in burdock, or spines with retrorse teeth as in beggar ticks. The object is the same in all cases; viz: to make animals and man the agents in scattering the offspring. It is too late, now, in most cases to observe the mechanical means of propulsion employed by wild geranium, wood sorrel, violet, etc. It may be, however, that a branch of witch hazel (Oct. 30th) in flower, if taken home may some night surprise the collector by an unwarrantable artillery discharge. The shinning seeds are forcibly expelled from the woody capsules. We have often tried to analyze—it is too subtile a sentiment to catch—the peculiar feeling induced by the spider-like yellow flowers of this witch hazel or *Hamamelis.* Why should it bloom so late, even after its own foliage can no longer give it countenance.

Sometimes one sees, brought from the West Indies, the so-called "sand box." This is a woody capsule, in which the tension is so great, that when relaxed the seeds are sent in a noisy bombardment to a long distance. Who could fill that box—repack it again? "Where is that Promethean heat which could its light relume?"

We cannot, in so brief an article by any means exhaust the list of ways in which seeds are dispersed. Many fruits, by their colors are attractive to animals. Their pulp may be eaten and the seeds rejected. Then, as every one knows, birds make a tremendous scattering when they alight on a thistle top or a sumac. Nature's political economy is not always to be seen of men. Water is an agent in transferring many seeds and fruits which by special levity or by contrivances adapted to the purpose, float on stream river or ocean. There is no more fascinating study than is afforded by this branch of ecology.

Providence, R. I.

THE ROMANCE OF THE VIOLET

THE modest violet is everywhere, but how many admirers of this universal favorite are familiar with the story of her wanderings and fidelity and of her gradual change from white to blue? Viola's history is inextricably bound up with that of the beautiful Io, daughter of the King of Argos, priestess of Juno, and beloved of Jupiter who, on account of the jealousy of Juno, changed Io into a milk-white heifer. But this stratagem could not escape detection by Jupiter's queen, and through her blandishments she obtained from him the gift of the heifer, which she placed in her grove at Mycenae, under the charge of watchful Argus with the hundred eyes, of which only two ever slept at one time.

Now to the rescue comes Mercury, most wily, most versatile of all the gods. Mercury, was a young man in a broad-brimmed hat adorned with wings bearing a staff in his right hand and winged sandals on his feet. He was herald general to the gods, interpreter of dreams, god of eloquence and presiding deity of thieves; he prophesied with loaded dice, bound Ixion to the wheel, chained Prometheus to the rock, and at length borrowed the pipe of Pan with which he lulled hundred eyed Argus to sleep, cut off his head and delivered Io, for which exploit we are duly grateful, because without the wanderings of Io in the form of a white cow tormented by a gad-fly, which pursued her in a state of frenzy over the whole earth, perhaps we should not have the gentle violet to brighten our spring rambles and make glad our hearts. Thus we are told that the dainty violet was created by Jupiter and dedicated to Io to be her companion during her wanderings up and down the earth. Wherever she went to escape the persecutions of Juno in the form of a gad-fly violets sprang up to keep her in good cheer and remind her of Jupiter's constancy. Especially in pastures green and along the borders of shady streams are

these beautiful flowers found in great abundance, for to such retreats resorted Io to find sustenance and seek refuge from her tormentor. Even to this day, although most of the violets have become blue from looking up at the sky, where Io now dwells, they love to follow the cows wherever they go, whether to mossy dell, moist meadow or shady wood, and whenever you find bossy standing knee deep in the brook down by the "old swimmin' hole" just look along the banks and there you will find great companies of Io's faithful retainer and consoler, the humble, modest, delicate violet.—*Philadelphia Record.*

STRUCTURE OF LILY PISTILS.—The old idea of a compound pistil was that it consisted of two or more transformed leaves with their margins united and projecting inward bearing the ovules. This view is essentially correct except that it is likely carpels never were leaves although homologous with leaves. Since such leaves as produce buds usually produce them on their margins it would of course be expected that in a compound pistil the bud-like ovules would be produced on the part of the carpel corresponding to the margin of the leaf. This in fact is what usually happens, but not always. According to C. E. Temple in *Science* many members of the lily family, among which are the tulip the white erythronium, the lily-of-the-valley and the various "Easter lilies," bear their ovules upon the middle part of the carpel. Even the partition walls of the pistil may be developed from this part. At first glance this may seem "contrary to nature" but it is no more remarkable than that certain cells should develop leaves and others petals, in the first place. Nature has a variety of ways of accomplishing the same purpose, and has apparently decreed that more than one region of the carpel may bear ovules, without regard to how much it may confuse our previously conceived notions concerning the process.

NOTE AND COMMENT

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their shorter botanical items. The magazine is issued as soon as possible after the 15th of February, May, August and November.

ELEMENTARY SPECIES OF LINNAEA.—The pretty little plant named for the great Swedish botanist has now had its turn at the hands of a persevering German who finds that our single species may be resolved into no less than 140 elementary species with several sub-forms. Linnaeus has been called "the father of botany" but we are inclined to think that were he alive he would be likely to decline to father such botany as this.

THE PARASITE OF A FUNGUS.—Since the fungi are lacking in chlorophyll, without which plants cannot make food from the air and water, they are obliged to depend upon ready-made food derived from other plants or animals. If the fungus lives on dead and decaying matter it is called a saprophyte, but if it attacks living things it is a parasite. Occasionally certain speces of fungi show that there is not always "honor among thieves" by preying upon one another. Thus the mushroom *Collybia dryophila,* which lives upon dead wood, is in turn obliged to support a smaller fungus known as *Tremella mycetophila.* In the *Ontario Natural Science Bulletin,* H. H. Whetzel recently recorded another case of this kind in which *Cephalothecium roseum* was found living on one of the hard puff-balls, *Scleroderma vulgare.* The *Cephalothecium*

is a familiar fungus to sight at least, and will be remembered as a thin growth pinkish in color, to be seen frequently on dead and decaying substances. It appears to be very common on the puff-ball mentioned and has also been found on decaying apples.

The Fertile Spike of Ophioglossum.—After a study of the vascular system of the sporophyte of the Opioglossaceae M. A. Chrysler supports the view that the fertile spike is to be regarded as consisting of two fused pinnae. This is true of the species of *Botrychium* in which the fertile spike has a double vascular supply. The allied genus *Aneimia* is remarkable for always having two fertile spikes on each frond, both springing from the base of the frond and very evidently transformed pinnae. In view of this the double vascular supply to the *Botrychium* spike is quite according to nature. The *Ophioglossaceae* have always been regarded as a very ancient and simple family of ferns, but if the new view is correct, they may now be considered rather highly specialized.—*Fern Bulletin.*

New Method of Forcing Plants.—Most plants in temperate regions where the cold of winter is severe enough to put an end to plant growth, have learned to take a rest in winter and this habit has become so thoroughly fixed that even when dug up and kept in a greenhouse, such plants refuse to grow until they have finished their natural dormant period. By taking the plants up early in autumn and giving them a good freezing it has been found that they begin at once to grow. Evidently the cold has something to do with the acceleration of the resting process. A few years ago, it was discovered that by exposing plants to the fumes of ether or chloroform for a short time, they would grow exactly as they would if frozen or if allowed to finish their natural period of dormancy. Recently a German, Prof. Molisch, has written a pamphlet in which he claims that the plants can be forced as

well by warmth as by cold. In the new treatment, all that is required is to immerse the shoots of the plants to be forced, in water at a temperature of 30 to 35 degrees centegrade (about 80 or 90 degrees of the ordinary scale) for ten or twelve hours, after which they are to be kept in a dark moist chamber at a temperature of about 80 degrees until they begin to grow. Then they are brought into ordinary greenhouse conditions and bloom very quickly. Lilacs, azaleas and spiraeas treated in the middle of November were in bloom by Christmas while untreated plants of the same kind had not started. The simplicity of the process opens up attractive possibilities for even the novice in gardening.

The Versatile Woodbine.—Climbing plants may be placed in four general groups as regards the means for getting up in the world. Least specialized are the scramblers, such as the bed straw (*Galium*) and certain climbing roses and brambles. These depend upon their recureved prickles to catch upon other plants and hold them in place. More successful are the twiners like the bean and hop that simply wind their stems about other vegetation. The root-climbers are more common in the tropics than in our own region but they are not without representatives here in such forms as the poison ivy and the English ivy. The most highly specialized group comprise the tendril-climbers. The tendrils may be modified stems as in the grape, petioles as in the garden nasturtium, stipules as in the species of *Smilax,* veins of the leaf as in the pea, or even in the tips of the leaves themselves as in various tropical plants. As to methods of attachment, two forms are noticeable, one in which the tendrils wrap around the object the other in which the tips spread out in sucker-like disks. This latter form is usually developed when the plants climb upon rocks or the trunks of trees. Very few plants possess more than one of these methods of climbing but the common woodbine (*Ampelopsis quinquefolia*) is more for-

tunate. Normally it is a tendrid-climber like the grape to which it is near allied, but on occasion it may develop adhesive disks and it frequently put out roots like the poison ivy. Nobody seems to have investigated the subject to see if the three methods of climbing indicate three forms of the plant.

COAL FROM PLANT SPORES.—A writer in a recent issue of *Rhodora* reports that certain coals that have been investigated, consist almost entirely of the microspores and megaspores of certain fern allies that flourished during the coal forming period. By careful manipulation of the coal it is possible to study the spores satisfactorily with the miscroscope. These spores are the next thing to pollen grains—pollen grains themselves being essentially spores—and the bituminous matter found in some coals is regarded as produced from the waxy matter contained in the spore coats.

FRUITS RIPENED BY CHEMICALS.—The ripening of fruits is essentially a chemical process. Everyone is familiar with the fact that even the sweetest fruits may be sour or astringent until they are nearly ripe. When they are full grown, or "full' as the grower often expressed it, a gradual change occurs. The tannin, starches and other constituents of the fruits are slowly turned to sugars by a process akin to digestion in animals if, indeed, it is not exactly like it. This being the case many experiments have been undertaken to advance or retard the ripening process. In fruits, such as the banana, that have to go a long way to market, they are usually picked before they are ripe and, since they will carry best in the green condition, no effort is made to hurry their ripening. On the contrary the ripening process is retarded. At the end of their journey, however, it is often desirable to ripen them at once. This is accomplished in some fruits by exposure to the sunshine, or by heating. A writer in *Science* mentions a new and very successful method which consists in exposing the green fruits to

the fumes of various chemicals. Benzoic and salicylic acids produce results at once but the most potent agent thus far found is acetic acid. By exposing green dates to the fumes of this acid for 12 hours, the experimentor was able to ripen them in three days. Since the ripe fruit of the date deteriorates very rapidly it cannot be sent to market in the fresh state, but the new process will allow it to be sent green and ripened at the end of the journey. The process is probably applicable to many of the perishable fruits of the tropics.

The Names of Plants.—The last congress of botanists to legislate regarding the names of plants, decided that a large number of generic names should not be changed. This was on account of their long use by botanists, though according to strict "priority" they should be changed. In this case "priority" would mean any name published after 1753 and before the one now in use was published. To go back to 1753 as a starting point is bad enough, but there are several anxious botanists who object to even this date and who want all restrictions removed so that they can trace their plant names back to those given by Adam. They say with truth that this is the only way to secure real priority, but what does priority really matter. How silly it is for scientists, sane in every other respect, to want to change well-known names of plants for those totally unfamiliar. Most botanists of this type have accumulated a large stock of ancient and musty volumes from which, if the 1753 bar is removed, they expect to dig up a lot of old names to supplant the familiar and just as useful ones we have at present. This will not help science in any way, nor will it add to our knowledge of plants, but it would increase the possibilities in that game of word making which closet naturalists delight to play and would give them a chance to associate their own names with those of ancient botanists about as worthy of remembrance. It is to be hoped that no botanical congress will consent to open this Pandoras box.

ARCTIUM MINUS LACINIATUM.—On pages 83 of your current number there is a note on the new form of burdock. I noticed the same plant growing in a street on South Bend, Ind. I intended transplanting it, thinking it a teratological form. The discription agrees perfectly with the plant I found, and if it reappears I will send leaf specimen.—*J. A. Nieuwland.*

PLANTS AND COLD.—It has always been more or less of a puzzle, even to the scientist, to decide how certain plants are able to survive the winter in the leafy condition. It is sometimes stated that the cells of such plants are so small that freezing the water in them does not rupture the cell walls, or even that the cells do not contain sufficient moisture to make its freezing a disturbing feature. A Swedish botanist has recently offered another explanation to the effect that such plants, at least in northern Germany and Scandinavia, contain sugar instead of starch during the winter and that the sugar in some way protects the protoplasm from freezing.

POISONOUS TOMATOES.—Our old familiar friend the tomato is under suspicion again. When it first obtained a place in cultivation it was under the guise of an ornamental plant named love apple. As such it was regarded as deadly poisonous and its relationship to the nightshades gave color to the belief. Sooner or later, however, it was found to be edible and thereupon it was transferred to the garden where it has since remained as a highly prized fruit. Its harmful character has always been more or less hinted at, however, and but a short time ago tomatoes were reputed to cause cancers. Of course this was all nonsense, but there seems more truth in the charge that is now being made by various physicians to the effect that some kinds of tomatoes are likely to cause heart trouble. Since all people are not affected alike it seems still to be a question whether all tomatoes are harmful or, whether

only a few persons are susceptible. It is well known that the luscious strawberry appears to be poisonous to some people, but that does not prevent the rest of us from indulging in strawberry short-cake. The harm in the tomato is laid to "lycopersic acid" whatever that may be. It is supposed to be most abundant in tomatoes that have been picked green and ripened on the way to market and the moral of all this is that one should eat only fresh tomatoes, and the inference that he should grow them himself. If the fact that some people's hearts are affected by stale tomatoes induces every man to make a garden, we shall welcome the discovery of "lycopersic acid."

Japanese Air Plant.—Whether or not, as P. T. Barnum averred, the public like to be humbugged, it is pretty certain that most people stand in grave danger of being duped because of their ignorance of botany. Last autumn, at a country fair the writer came upon a vendor of the "rose of Jericho" which was nothing else than our well-known "resurrection fern (*Selaginella lepidophylla*). The specimens were highly perfumed and the dealer was loud in his praises of the "large red flowers" which he asserted they produced. Pressed for further information in the writer's most guileless manner, the dealer enlarged upon the merits of his wares, telling how they grew in a remote part of South America and were imported with great difficulty. When skepticism about the large red flower was expressed, the dealer insisted that he had seen one in bloom within the week, that its perfume could be smelled for several blocks and offered to forfeit ten dollars if they could not be smelled that far *when they bloomed!* But, alas, the *Selaginella* never does bloom. Many people, however, paid twenty-five cents for a specimen of the wonderful plant. Evidently this humbug is about worked out for we begin to find a new creation offered as the Japanese air-plant. This is a small deep green moss-like plant that is said to live entirely

upon air. In reality it is a sea-weed *Demarestia aculeata* which the Japanese make a business of collecting and preparing for display. Its feathery appearance makes it a very decorative object, but the statement that it is alive and lives on the air is of course, all nonsense.

Plants in the Antarctics.—Of course a botanist accompanied Lieutenant Shackleton's party in a search for the south pole but he doubtless had an easy berth as soon as the real journey began, if his sole duties were the collection and study of plants. Plant life appears to be pretty scarce in high southern latitudes, but the party encountered certain plants from warmer regions that they would have gladly avoided. The leader of the party reports that their health was excellent except for certain colds that were evidently due to germs from a bale of blankets. Thus these minute but annoying plants that produce so much discomfort in lower latitudes during the winter have extended their migrations to the frozen south.

Zoological Nomenclature.—The zoologists have slightly the advantage of the botanists in the matter of nomenclature in that they started earlier to make a "stable" nomenclature but in their efforts in this direction they have been no more successful than have those of the name tinkerers of plants. In a recent number of *Science,* Jonathan Dwight, Jr., pays his respects to the zoological code as follows: "Codes do not evolve but are made for convenience and we should quit burning incense before the shrine of priority if we seek stability. Priority is rather a bog from whch the nomenclatural muck-rakers exhume the fossil names of a past age. We shall always be at the mercy of forgotten names tucked away in stray volumes unless there be some "statute of limitation" —the bug-bears of code makers. Let the upturning of the names of obscure writers be stopped and the remodelling of codes with fresh interpretations of their canons be prevented.

It is not justice for the dead zoologist that we held so much as justice to the living, and even now, the dead get no recognition if they violate the rules of the game unknown in their day. The "statute of limitation" needed at the point where codes break down is a responsible body of men whose rulings will be respected by every scientific man who cares more for stability of names than he does for his own preferences."

Carrots and Color —Make a very thin section of the common carrot root, place it under the microscope and with proper magnification you will see certain angular pale orange colored bodies in the cells. These are crystals of carotin and it is to them that the color of the carrot root is due. This fact would be of no great significance but for the fact that it is this same carotin that produces the characteristic color in many orange yellow fruits such as those of the mountain ash and triosteum. Nature has two ways of coloring her brilliant specimens. In one case she colors the cell sap, in the other the color is lodged in tiny bodies called chromoplasts within the cells. It is a curious fact that the color of blue and purple flowers is always due to colored cell sap but red, orange and yellow fruits and flowers usually bear their colors in chromoplasts.

Nectar Statistics.—We sometimes get new light on an old subject in the most indirect way. For instance the chance for insect pollination among the flowers is shown to be very good when we consider the annual output of honey. It has been estimated by careful observers that a bee carries about three tenths of a grain on each trip to the hive and therefore a pound of honey—or rather nectar, since the nectar has to be evaporated to make honey—a pound of honey would require more than twenty thousand trips of the bee. It is not to be wondered at, in the light of these facts that the life of the average worker bee is said to last not longer than six weeks.

Fortunately the average hive of bees contains often as many as fifty thousand workers. On each collecting trip the bee visits at least ten flowers and the bees of a single hive must daily call at some millions of blossoms. The honey-crop of this country reaches the astonishing amount of nearly 130 million pounds annually. Some genius with a taste for figures and some leisure time, may be inclined to figure out the number of blossoms visited by the bees in their labors. He should not forget to allow for the trips made for pollen and for the honey to make into wax and for the honey consumed by the bees, and for the water that must be evaporated out of the nectar, and for—but this is enough for a start.

Species Produced by Crossing.—In recent years we have heard a great deal of Mendel's Law as applied to the crossing of animals and plants. Briefly this law reads that when two different species are crossed, the offspring tend to resemble one of the parents to the exclusion of the other. By breeding these offspring together, however, a second generation is produced, 25% of which resemble one grandparent 25% of which resemble the other grandparent and the remaining 50% resembling their own parents in being mongrels or hybrids. This second generation of hybrids if bred together will give again 25% of one, 25% of another and 50% hybrids, and so on apparently for ever. Mendel's Law was first published nearly fifty years ago but until recently received absolutely no attention and it was commonly supposed that hybrids, instead of having the capacity of producing pure species resembling their own parents, were either sterile or only capable of continuing the hybrid race. The re-discovery of Mendel's law has caused scientists to go to the opposite extreme and to apply the law to almost everything, but now comes Burbank saying that in his work he has frequently crossed distinct species and got therefrom, not a hybrid reproducing according to Mendel's law, but a very distinct species in which the char-

acters of the two parents were perfectly blended and which reproduced itself exactly with no tendency to produce forms resembling the species started with. Some of these "new" species cited are the Logan berry; the wonder berry, a cross between *Solanum guinense* and *S. villosum;* a cross between *Rubus occidentalis* and *R. strigosus,* another between *Rubus idaeus* and *R. villosus,* and many others. This, if true, forms an overlooked factor in species making.

Storage of Water by Seeds.—The very first requirement of seeds, when they begin to grow, and an absolute necessity to the young seedling, is water, and yet nature has seldom contrived any method whereby the seed may store up water for the sprouting embryo. In a few cases, however, this end has been accomplished. The mucilaginous seed coats of flax and quince are able to absorb considerable moisture from a shower and retain it for the use of the seedling. In a similar way the spongy covering of the garden nasturtium absorbs water and the central spongy layer in the walnut and hickory nut which carries water to the interior, after the manner of a lamp wick, is well known. At one end of the castor bean there is a spongy outgrowth of the testa and this has been shown to be of use in absorbing water which passes directly into the seed at this point.

Trees for Street Planting.—One can always detect a new and "green" community by the presence of an abundance of weeping mulberries, cottonwoods and box elders. These species have their place but that place is not in this State today. They are temporary structures and should be avoided unless absolutely necessary for the protection of more stable and slower growing material or in desert country where nothing else will grow. Do you want to know what is good and why? The American elm is the best tree in the world for street or lawn. It is tall and wide spreading, hardy and grows fairly

rapidly after the third or fourth year. The Norway and sugar maples and the ash are also very desirable. Of the fine lawn trees any of the following are excellent and should grow well in this State: horsechestnut, linden, sycamore, tulip tree, hackberry and I cannot recommend too strongly the use of evergreens such as the Austrian pine, the hemlock and the white and Norway spruce."—*Illinois Agriculturalist.*

THE SPINDLE TREE.—In many parts of America there is a small shrub, related to the well-known bitter-sweet (*Celastrus*) which, like it, bears in autumn and early winter, numerous pink capsules that early split open displaying the brilliant red aril which surrounds each seed. With us it is usually called burning bush, strawberry shrub or wahoo, but allied species in England go by the name of spindle trees. This last name is a very ancient one and according to most writers has been given to the plant because its wood was once used for skewers. History does not say what property of the wood caused this species to be singled out for the purpose and there seems to be less reason for the use of the name than there is for the application in a similar case of ironwood or lever-wood to our species of *Ostrya* and *Carpinus.* But there is no accounting for common names.

SAGO.—The name sago is derived from *Sagu* an East Indian name for a granular starch obtained from various species of palm. A similar material may be obtained from certain of the cycads close allies of the pines. One common cycad frequently seen in conservatories is often called sago palm on this account. While the true sago may have been derived from palms the name nowadays is applied to a variety of starches. Even tapioca may be said to be a kind of sago. The so-called "Portland sago" was made from the corms of the European cuckoo pint or lords-and-ladies, a sort of arum closely allied, and similar in appearance, to our familiar Jack-

in-the-pulpit or Indian turnip. The European plant in its natural state is quite acrid and reputed to be poisonous, but yields the sago upon being baked. The acrid properties of our own plant are well known but these disappear when the corm is dried and doubtless it, too, would yield sago on proper manipulation. A man lost in the woods might sustain lfe for a long time if he but knew of the sources everywhere about him upon which he could draw.

USE OF CACTUS PLANT RIBS.—Everybody knows that the cylindrical and spherical species of cactus are usually strongly ribbed, but the reason for these ribs is not so well understood. If one should make a cross-section of one of these plants he would find the fibro-vascular bundles, which distribute the absorbed moisture to the plant, to be situated it a circle near the center of the stem. Between these bundles and the outside of the stem is the region in which the surplus moisture is stored. The ribs on the cactus plant act somewhat on the plan of an accordeon or the bellows of a camera, expanding or contracting with the supply of moisture. This enables each plant to take up a large supply of water under favorable circumstances. If the stem was a mere cylinder the thick and tough outer skin would only allow of storing a definite amount, but with a ribbed stem the absorption of water can go on indefinitely.

FAMILY NAMES.—In certain recent books dominated by a purely local nomenclature we have seen some of the familiar family names displaced by new ones. Thus Poaceae and Pinaceae, are used for the grass and pine families respectively. Leguminosae is replaced by Fabaceae, Cruciferae by Brassicaceae and so on. These do not appear to be likely to come into general usage, for which we may be thankful, but we may be still more thankful that others with which we are threatened do not seem to have a chance of gaining place. If they did we

might find our Primulaceae under the name of Rotaceae, our Chenopodiaceae masquerading as Holeraceae, the Ambrosiaceae called Nucamentaceae, the Boraginaceae as Asperifoliae and the Violaceae as Melanideae. All these names would be used if priority prevailed, but what good would the changes do? None that we can think of; but the harm the changes would work are very potent. It would confuse the beginner, make an endless trouble for the older student and render all works of botany in a measure unintelligible to beginners who took up the study of plants under the new names. Of all the people studying plants not one desires a change of names. Only those with axes to grind really favor a shake-up.

Christmas Trees.—It requires about four million small trees annually to supply the demand for Christmas trees and some nervous individuals have inveighed against the Christmas tree custom for fear it may add its share to the drain our diminishing forests have to bear. According to the United States Forester, however, we have little to fear from this source. It would require only about 1,500 acres to grow all the Christmas trees used in the United States. This is a very small item compared with the hundred thousand acres needed to supply the lumber mills for *a single day*. A single yellow newspaper devoted to sordid records of murder, suicide and other crimes makes a much heavier demand on the forests. It would be far better for both the forests and the peeople if there were Christmas trees in every home and only four million yellow journals ever issued.

Remedy for Ivy Poisoning.—For the benefit of the few that cannot handle poison ivy without ill effects, we note another remedy for poisoning by it. This is tincture of *Grindelia*. It is to be diluted with four or five times as much water and the affected parts bathed with the solution or covered with cotton or gauze saturated with it.

Common Names.—The only thing certain about common names, is that a plant has a common name when it is commonly called by that name in any part of the world. This reflection is induced by a note in a British contemporary protesting against the use of thorn-apple as a common name for the fruits of our species of hawthorn or *Crataegus*. "Considering its long accustomed use for *Datura*" says the writer, "this must cause confusion." Here in America the case is just the other way about. Confusion would exist if our common Jimson weed were called thornapple. Considering the case strictly on its merits, the hawthorn fruits have much the best right to be called thornapples for they are certainly little apples and they are borne on thorn trees. Nevertheless we shall have to let it go at that, for both plants are commonly called thornapple in different parts of the world and thus both are entitled to the name.

Growth of Trees.—Considerable uncertainty exists as to the time necessary to grow merchantable timber, but only upon an exact knowledge of such things can a satisfactory policy of forest management be based. According to a writer in *Forest Leaves* the time required for various kinds of trees to reach a diameter of twelve inches is as follows: pin oak 40 years, black oak 50 years, red oak 58, white oak 100, sweet gum 62, walnut 56, tulip tree 50, black locust 45, ash 72, hickory 90, catalpa 20, Carolina poplar 12. Of course the character of the soil, water supply and location have much to do with the slow or rapid growth of trees, but these figures seem fair averages. As to the time required for greater diameters the same writer gives records of actual counts for various trees, some of which are added here: Hackberry 25 inches, 115 years; elm 27 inches, 120 years; sugar maple 38 inches, 155 years; sycamore 57 inches, 260 years; tulip tree 57 inches, 225 years; sour gum 25 inches, 141 years; beech 36 inches, 165 years; black willow 18 inches, 50 years.

EDITORIAL

This number closes our fifteenth volume and we turn toward volume sixteen with a determination to make it as good as those that have gone before it, and as much better as possible. Our country is yet too young for us to hope for a very extended subscription list. We are still too busy taking an account of stock, in collecting and naming and naming again everything that looks like a plant. This magazine never has been directed to those who collect and swap plants, but rather to that thoughtful few who are interested in the wonderful ways of the plants themselves. Not that we believe that those who really appreciate the plants should always be in the minority. One of the inducements toward founding the journal was that by so doing we might aid in reducing the number of those who have no abiding interest in real botany. But the work goes slowly and we would that our readers would realize that the interests of this magazine are their own. The more people there are who are interested in botany, whether subscribers to this magazine or not, the more abundant and better will be the books and publications devoted to our phase of the subject. This being so, we hope our friends will continue to help us push the magazine. We know there are many who neglect no opportunity to recommend it to lovers of nature among their acquaintances but we need your subscription for the new volume; will you not send it in early?

* * *

Recent numbers of *Plant World* have contained a large number of short items which have been received with enough favor by readers to induce the editor to continue or even to enlarge upon the idea in future. The same conclusion with reference to short notes was made by this magazine several years ago and it is pleasant to note the spread of the idea. Now and

then a scientist, after much labor may discover enough new facts to make a long and imposing article, but most discoveries do not warrant so much space. There is not a botanist of the editor's acquaintance, however, that could not sit down and write out dozens of such short notes and yet these very notes for which all botanical publications are searching remain unwritten because their possessors cannot make a long article out of them. Winter is a good time to write up such notes. Why not begin another year by sharing your interesting experiences with others of similar tastes.

* * *

The conventional idea of a botanical club, is an association of botanists for the purpose of presenting and discussing papers on their chosen subject. All too frequently, however, the interest in such a club wanes for want of enough people with the leisure and inclination to keep up the supply of papers. Moreover, there are usually in such societies a number of people who imagine they cannot write a presentable paper. Often the only obstacle in the way of forming a good strong botanical society is the feeling among those who ought to join that they are not fitted to take part in the programs. To all such we would suggest the scheme of taking up some single book and discussing it, Chautauqua fashion. The editor knows one society of this kind composed of people with no special pretentions to being botanists but with a rather lively interest in plants, that has finished one successful season and is starting on a second. The plan is for each member to secure a copy of the book decided upon, to read the assigned pages at home and to take part in the discussion at the weekly or fortnightly meetings. If there are any working botanists in the club, they can be relied upon to present original papers. The book selected for study would depend somewhat upon the attainments of those forming the club. If without much botanical knowledge, Vincent's "Plant World" (80c.) or Grant Allen's "Story of the Plants" (40c.) would be good for a beginning.

More advanced students—say those who have had a course in high school botany would find such a book as Arthur and MacDougal's "Living Plants and their Properties" ($1.25) desirable. Other books for special subjects would be Bailey's "Plant Breeding" ($1.25), Grant Allen's "Colors of Flowers" ($1.00) or Henslow's "Origin of Floral Structures" ($2.00). We cannot too strongly urge upon the plant collector that real botany is more than the preserving and naming of plants. Many very intelligent people amass large herbariums and become familiar with every species in their region without suspecting that there is a vast and unexplored field of the greatest botanical interest close at hand that needs only a proper introduction to be as fascinating as ever plant collecting and naming could be. This is the time of year when clubs of the kind we have mentioned are most easily formed. Those who have tried without success to get their friends actively interested in botanical studies should try the merits of such a club. We shall be glad to send a copy of this magazine free to every club of four or more members organized after this plan and will continue to send the magazine as long as we receive quarterly reports from the club regarding its work. We hope that all who are tired of studying botany alone will go to work at once to organize a club.

BOOKS AND WRITERS

That there are more than fifty thousand different species of fungi in the world is not hard to realize after a look through Prof. F. E. Clements' "Genera of Fungi," in fact it is this vast number of fungi that make such a book either necessary or possible. For many years the descriptions of the plants belonging to this great group have been accumulating in the various volumes of Saccardo's "Sylloge Fungorum" but in this form were almost inaccessible to students. The present book is designed to key out the genera and families of Sac-

cardo's great work but with the families rearranged according to the results of the author's studies. In it are keys to the orders, families and genera of fungi, a guide to the volumes of Saccardo's "Sylloga Fungorum," an index to the families in the "Sylloge" and in Rehm's "Discomyceteen," and various lesser lists. Numerous surprises await the botanist who has not kept closely in touch with advances in fungology. The genera are listed under the four familiar classes Schizomycetes, Phycomycetes, Ascomycetes and Basidiomycetes, but a few come under the class Chlorophyceae. The fungi imperfecti are listed separately. One looks in vain for the Saccharomycetes. These have been included with the Ascomycetes. In the same group, also, are found the rusts and smuts which in other works are usually found among the Basidiomycetes or else by themselves as Aecidiomycetes. The line between lichens and fungi has been entirely obliterated, the lichen genera and fungus genera being arranged quite according to the fugus relationship. The book ends with a glossary so complete that it resembles a Latin dictionary. More than 2700 genera are keyed out in this work; it would be out of the question to include the species. All who work with the fungi owe a great debt to Prof. Clements for issuing such a book. The book is an octavo of 220 pages and is issued by the H. W. Wilson Co., of Minneapolis at $2.00.

Books on agriculture are rapidly appearing but none too rapidly considering the need of the schools for teaching agriculture and the long way behind the times such teaching is. A new book issued by the American Book Co,. is "Practical Agriculture" by John N. Wilkinson. This takes up the subject by some sixty pages devoted to soils, tillage and the needs of the plant followed by half as many relating to special crops after which comes such subjects as fertilizers, propagation of plants insect friends and foes, more special crops, landscape gardening, stock feeding, animal husbandry, etc., etc. Al-

though the book does not appear to be a large one, the text runs to nearly four hundred pages. To the reviewer the arrangement of the subject matter seems to indicate that it was rather hastily put together and would profit by a more careful and connected arrangement. Too much emphasis is placed on recitations regarding subjects about which the pupil can have no first hand knowledge. Such directions as "Discuss the culture of black pepper" are out of place in a book intended for the farmers of America. In agricultural teaching there ought to be a minimum of reciting and a maximum of doing. Such practical exercises as are included are very good but the questions on the chapters are too indefinite for the pupils for which the book is intended. The book, however, will contribute its full share toward the teacher's equipment. It is well illustrated and shows a wider range of topics than is found in most books of like character.

"Elements of Agriculture" is the title of another text designed to advance the teaching of agriculture in secondary schools. It is written by G. F. Warren and published by the Macmillan Co. In contents it is essentially like other books on the same subject but takes up the topics in a different way beginning with chapters dealing with the improvement of animals and plants, the propagation of plants, plant food, the soil, etc. The latter half of the book is devoted to animal husbandry. The greatest difficulty a teacher must experience in attempting to use this work is the impossibility of using it all. There are more than 400 pages of text in which numerous laboratory experiments are called for and in addition there are extensive lists for collateral reading. The author covers too much ground and does not always confine himself to general principles. The work on special crops could well be omitted or included in a later course. The book, however, is one of the best we have seen. The directions for laboratory work are at times a bit indefinite, but the questions on the lessons

are characterized by sound sense as to selection and good judgment as to arrangement. Any teacher who cannot find valuable material in these questions is hard to suit. The book also abounds in striking and illustrative illustrations. All in all it is one of the best agricultural texts we have seen. The price is $1.00 net.

A sample copy of the *Sketch Book* published by A. E. Vogel, at Manchester, N. H., has just reached us. From the appearance of this number, we are inclined to think that most of our readers would be interested in sending for it. It is about such a publication as we should be tempted to issue if we had time and money enough to make it possible, and there were not so many other things that need somebody to do them. The *Sketch Book* draws freely from the works of Thoreau, Jeffries, Whitman, Burroughs, Howitt and writers of like tastes and we wish it continued success.

That nature study is gradually taking definite form is shown by the appearance of such books as "Practical Nature Study" by John M. and John G. Coulter and Alice Jean Patterson. The authors are wise enough to see that no set program for teaching nature study can be made, and the book in hand is therefore intended as a bundle of suggestions to young teachers by teachers who have successfully taught the subject. The first part of the book is largely a discussion of methods which can be read and re-read with advantage by all teachers of nature study and elementary science. Part II. contains an outline for work arranged according to grade and season, dealing with plants, birds, insects, the weather and the like. Part III. contains an outline for nature study and elementary agriculture in grades above the sixth, followed by twenty-seven chapters devoted to special subjects that may be studied, with discussions of the best ways of studying them. In Part IV. are discussions of bird study, school gardens, evolution

and like matters. All teachers who have anything to do with the biological sciences will find this a most desirable book. It is destined to give the teaching of nature study an impetus toward sanity. It is published by D. Appleton & Co., New York,

For the past eight years, John P. Brown has been editing the journal *Arboriculture* in the interests of tree planting and forestry in general, and the hardy catalpa in particular. During this time he has had the satisfaction of seeing the catalpa come to the front as a desirable tree for planting, and has seen many millions of these trees set out by the railroads for the production of poles and ties. With the October number the magazine ceases publication. Evidently the catalpa can now "go it alone."

There are about a hundred woody plants growing in the vicinity of San Antonio, Texas according to a little booklet issued by Bernard Mackensen of the San Antonio High School in which each species is discribed in untechnical language, its time of flowering and fruiting noted, and all common names cited. The southern affinities of the flora are seen in the inclusion of many names unfamiliar to botanizers in the Northern and Eastern states such as *Ephedra, Cebatha, Prosopis, Sapindus, Zizyphus* and *Cestrum*. In genera like *Quercus* and *Celtis* common to both regions the difference in floras is seen in the fact that different species take the place of our common forms. The booklet must be of special value to students of the woody plants of southern Texas, but is of interest to all botanists. Teachers in the schools of other parts of the country could take an example from this book with profit.

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CONTENTS